CHANGING FUNCTIONS OF THE CBD IN SMALL URBAN AREAS: A CASE STUDY OF LAFAYETTE, INDIANA

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BY

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JHRP

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Final Report

CHANGING FUNCTIONS OF THE CBD IN SMALL URBAN AREAS: A CASE STUDY OF LAFAYETTE, INDIANA

To: J. F. McLaughlin, Director
Joint Highway Research Project

From: H. L. Michael, Associate Director
Joint Highway Research Project

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The attached report "Changing Functions of the CBD in Small Urban Areas: A Case Study of Lafayette, Indiana" has been prepared by Mr. Shoukry T. Roweis, Graduate Assistant on our staff. Mr. Roweis also used the research report as his thesis for the MSCE degree.

The research was performed with the cooperation of the City of Lafayette as a background study for its current redevelopment studies and comprehensive transportation study. The study examines the changes which have taken place in the central business district (CBD) of Lafayette between 1950 and 1967 so as to permit better prediction of the future role and use of this area. The study also seeks to develop a simplified methodology for analyzing CBD functional changes in small urban areas.

The report is presented to the Board as information and for the record.

Respectfully submitted,

Harold L. Michael

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TABLE OF CONTENTS

Page

LIST OF TABLES v

LIST OF FIGURES..... vi

ABSTRACT..... x

CHAPTER I. INTRODUCTION..... 1

An Overview..... 1
Statement of the Problem..... 3
Scope and Purpose..... 5
Current Methodological Approaches..... 6
Procedural Outline of Study..... 10

CHAPTER II. DELIMITATION OF THE CBD AND THE CENTRAL CORE..... 12

Current CBD Delimitation Techniques..... 12
Delimitation of the CBD..... 14
The CBD Core-Fringe Concept..... 19
Delimitation of the Central Core..... 21

CHAPTER III. DATA COLLECTION..... 24

General Considerations..... 24
Data Sources..... 24
Reference Years..... 25
Space-Use Classifications..... 25
Complete Enumeration and Sampling..... 27
Space-Use Data..... 27
Assessed Valuations Data..... 29
Employment Data..... 31

CHAPTER IV. ANALYSIS OF DATA..... 34

Descriptive and Inferential Statistics..... 34
Changing Importance of the CBD in the Urban Area..... 35
Numbers of Business Establishments..... 35
Assessed Valuations on Land and Improvements..... 37
Employment..... 45

TABLE OF CONTENTS (continued)

Page

Internal CBD Functional Changes..... 48
Space-Use..... 48
Changes in Total Floor Space..... 48
Changes by Space-Use Categories..... 52
One-Digit Space Uses..... 52
Two-Digit Space Uses..... 55
Three-Digit Space Uses..... 59
Changes in Vacant Floor Areas..... 67
Changes in Parking Areas..... 74
Assessed Valuations..... 80
Assessed Valuations on Land..... 81
Assessed Valuations on Improvements..... 87
Assessed Valuations on Land and Improvements... 93
Employment..... 98

CHAPTER V. SUMMARY OF FINDINGS AND CONCLUSIONS..... 110

LIST OF REFERENCES..... 117

APPENDIX I: SPACE-USE CLASSIFICATION AND CODING SYSTEM. 121

LIST OF TABLES

Table		Page
1.	Land Areas of the Core, Fringe, and CBD as Percents of the Total Urban Area for 1950 and 1967	35
2.	Average Assessed Valuations in the CBD and in Selected Shopping Centers	44
3.	Losses in Street Floor Space and Gains in Parking Areas in the Core, Fringe, and CBD, 1950-1967	78
4.	CBD Highest Quarter Block Assessed Valuations per Square Foot of Taxable Land	80

LIST OF FIGURES

Figure		Page
1.	Location of the CBD in the Urban Areas	15
2.	A First Approximation to the CBD Boundary	17
3.	The CBD Boundary	20
4.	Delimitation of the Central Core - Criteria and Boundary	23
5.	Proportions of Numbers of Urban Area Business Establishments in the CBD	36
6.	Comparisons of Assessed Valuations on Land and Improvements for Core, Fringe, and CBD	38
7.	Comparisons of Assessed Valuations on Land for Core, Fringe, and CBD	40
8.	Comparisons of Assessed Valuations on Improvements for Core, Fringe, and CBD	41
9.	Proportions of Urban Area Assessed Valuations on Land and Improvements in the CBD	42
10.	Comparisons of Numbers of Employees for Core, Fringe, and CBD	46
11.	Proportions of Urban Area Employment in the CBD	47
12.	Comparisons of Total Floor Space on Street Floor for Core, Fringe, and CBD	49
13.	Comparisons of Total Floor Space on Other Floors for Core, Fringe, and CBD	50
14.	Comparisons of Total Floor Space on All Floors for Core, Fringe, and CBD	51
15.	Comparisons of the Proportions of Total Floor Space Devoted to One-digit Space-Use Categories for Core, Fringe, and CBD	53

LIST OF FIGURES (continued)

Figure		Page
16.	Changes in Floor Space Use, 1950-1967 (One-digit Categories).....	54
17.	Changes in Floor Space Use, 1950-1967 (Two-digit Categories).....	56
18.	A Comparison Between Space Uses Found in Shopping Centers and the Same Uses in the CBD.....	58
19.	The Functional Change Matrix - Layout and Definitions.....	61
20.	The Functional Change Matrix.....	63
21.	Appearing and Disappearing Space Uses, 1950-1967.....	65
22.	Comparisons of Vacant Floor Areas on Street Floor for Core, Fringe, and CBD.....	68
23.	Comparisons of Vacant Floor Areas on Other Floors for Core, Fringe, and CBD.....	69
24.	Comparisons of Vacant Floor Areas on All Floors for Core, Fringe, and CBD.....	70
25.	Proportions of Vacant Floor Areas on Street Floor in the Core, Fringe, and CBD.....	71
26.	Proportions of Vacant Floor Areas on Other Floors in the Core, Fringe, and CBD.....	72
27.	Proportions of Vacant Floor Areas on All Floors in the Core, Fringe, and CBD.....	73
28.	Comparisons of Private Parking Areas for Core, Fringe, and CBD.....	75
29.	Comparisons of Customer Parking Areas for Core, Fringe, and CBD.....	76
30.	Comparisons of Public Parking Areas for Core, Fringe, and CBD.....	77
31.	Comparisons of Parking Areas (All Types) for Core, Fringe, and CBD.....	79
32.	Land Value Indexes by Quarter Blocks, 1950.....	82

LIST OF FIGURES (continued)

Figure		Page
33.	Land Value Indexes by Quarter Blocks, 1957.....	83
34.	Land Value Indexes by Quarter Blocks, 1960.....	84
35.	Land Value Indexes by Quarter Blocks, 1963.....	85
36.	Land Value Indexes by Quarter Blocks, 1967.....	86
37.	Improvements Value Indexes by Quarter Blocks, 1950.....	88
38.	Improvements Value Indexes by Quarter Blocks, 1957.....	89
39.	Improvements Value Indexes by Quarter Blocks, 1960.....	90
40.	Improvements Value Indexes by Quarter Blocks, 1963.....	91
41.	Improvements Value Indexes by Quarter Blocks, 1967.....	92
42.	Extent of Land Improvements in Relation to Land Values by Quarter Blocks, 1950.....	96
43.	Extent of Land Improvements in Relation to Land Values by Quarter Blocks, 1967.....	97
44.	Total Numbers of Employees by Quarter Blocks, 1950.....	99
45.	Total Numbers of Employees by Quarter Blocks, 1957.....	100
46.	Total Numbers of Employees by Quarter Blocks, 1960.....	101
47.	Total Numbers of Employees by Quarter Blocks, 1963.....	102
48.	Total Numbers of Employees by Quarter Blocks, 1967.....	103
49.	Average Numbers of Employees per Employer by Quarter Blocks, 1950.....	105

LIST OF FIGURES (continued)

Figure Page

50. Average Numbers of Employees per Employer by Quarter Blocks, 1957..... 106

51. Average Numbers of Employees per Employer by Quarter Blocks, 1960..... 107

52. Average Numbers of Employees per Employer by Quarter Blocks, 1963..... 108

53. Average Numbers of Employees per Employer by Quarter Blocks, 1967..... 109

ABSTRACT

Roweis, Shoukry Tawfik. MS, Purdue University, January 1969. CHANGING FUNCTIONS OF THE CBD IN SMALL URBAN AREAS: A CASE STUDY OF LAFAYETTE, INDIANA. Major Professor: W. L. Grecco.

This study examines the changes that have taken place in the functions performed by the central business district (CBD) of Lafayette, Indiana during the period 1950 - 1967. The study also seeks to develop a simplified methodology for analyzing CBD functional changes in small sized urban areas.

The CBD was delimited on the basis of the predominance of non-residential uses. Within the CBD, a central core was distinguished from a fringe on the basis of land values. For the area thus delimited for 1950, 1957, 1960, 1963, and 1967, detailed data were collected on three major CBD functional aspects: space-use, assessed valuations, and employment. More general information on the above three aspects were also obtained for the urban area at large.

Two aspects of CBD functional changes were analyzed: (1) the changing importance of the CBD in the urban area, and (2) the internal CBD functional changes. Data thus collected and analyzed show that the relative importance of the CBD in the urban area has significantly declined during the study period. However, it still performed an essential role

as a tax base and as an employment center. Trade and service functions were the major CBD space users. While, in general, service functions gained in floor space, retail functions lost. Three attributes were found to influence the extent to which CBD functions gained or lost in floor space. These are: (1) degree of specialization, (2) importance of comparative shopping, and (3) compactness. Of all the CBD retail and service functions, the ones that are usually found in the shopping centers were the most adversely affected. Yet, the CBD still held, in 1967, more floor space devoted to these functions than all the principal shopping centers combined. Assessed valuations data indicate an increase in the relative value of land in the fringe. However, a substantial portion of this land was not efficiently utilized. Land in the core was relatively more efficiently utilized. CBD employment data show a predominance of small employers and a tendency toward scattering of the few large employers.

The CBD is adjusting to the changing urban patterns brought about through more extensive use of the automobile. Although the CBD lost some of its importance, it still performs many essential urban functions.

CHAPTER I. INTRODUCTION

An Overview

Fifty years ago, almost all the trading and service functions in the urban area were performed in the central business district (CBD). However, in recent decades, urban areas have undergone major spatial rearrangements of population and economic activities. The trend toward suburban sprawl, dispersion of activities and population, and lower densities in central cities has been well documented (1, 2).*

Within the urban area, the CBD is the most adversely affected by these spatial shifts and rearrangements. It suffered from numerous types of problems such as the decline in number of persons (daytime population), in relative position in retail sales, in land values, in transit riders, in number of businesses, and in additional capital investments. Concurrently, increased congestion and parking deficiencies have made trips to the CBD more difficult and expensive.

The factors behind these trends are varied and interrelated. A brief discussion follows on those factors which

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*Numbers in parentheses refer to numbered items in the List of References.

have acted to bring about the most significant changes in the character and functions of the CBD. First, there are the effects of growth itself. As there are diseconomies associated with increasing densities in already developed areas, new growth has little alternative but to locate in outlying areas, thus, diminishing the relative importance of the center. Second, technological developments, especially those related to space and accessibility requirements, have also played a vital role in bringing about CBD functional changes. The development of space-extensive technologies (both in manufacturing and retailing) has reduced the desirability of compact central locations. In parallel with increasing demand for space, the motor vehicle and the urban expressway have reduced the friction of distance thus attracting new development to outlying locations and away from the highly congested city center. Third, there are those factors pointed out by Bourne concerning the aging and obsolescence of the physical plant; both physical deterioration and the economic obsolescence (3). Buildings ultimately require replacement. This in itself will tend to encourage locational changes. Moreover, while demand for central locations was declining the buildings in the CBD were deteriorating and becoming less suited for the activities using them. In part, the problem arises from what Bourne described as the relative fixity of real estate resources as compared to the high mobility of social and economic demands for space and location (3). Fourth, the central business area has been traditionally singled out by

government officials and real property tax assessors as a principle source of tax revenues. As a result, CBD real properties are carrying assessments far out of line compared to their earnings and to the rest of the urban area. This is one of the main factors which has further discouraged appropriate maintenance, extensive remodeling, and new construction in the CBD and which has shifted activities to the less heavily assessed peripheral areas. This factor tends to be of decisive importance in the case of medium and small sized urban areas, where the advantages obtained in central locations due to accessibility to consumers are not consistent with the economic burdens of high taxes.

Other factors affecting the CBD include public transportation trends, highway and parking programs, and urban renewal projects. In general, the changes that are taking place in the character and functions of the CBD are closely related to changes in the urban system.

Statement of the Problem

Some of the general problems of the CBD which contains the highest unit land values take the form of deserted and blighted areas within its boundaries, relative reduction in its tax revenues, and a general lowering of its attractiveness as a place to work, shop, set up a new business, or expand an existing one.

Confronted by such urban phenomena, planners, economists, sociologists, and geographers appear to have expressed views

ranging between two opposed extremes. On the one hand, there are those who advocate the functional soundness of high density cores to meet the high level of social interaction which characterizes contemporary urbanized society (6). On the other hand, there are advocates of decentralization. This group believes that high density cores have come only as a result of an historic lag between the "modernization" of interurban and intraurban traffic. They feel that when this time lag was overcome, high density cores were bound to disappear (7).

The situation has become controversial because of the lack of community concern for CBD problems and even more important, the general disagreement on the nature, extent, and rate of changes taking place in the functions performed by the CBD. In emphasizing this lack of agreement, McLean writes:

> Although every one agrees that problems exist, authorities disagree on the nature of downtown's problems... . An extreme handicap in dealing effectively with [these] problems...has been lack of data on present and past conditions in the area, inadequate methods of evaluating available data, and the lack of coordination among various efforts for studying central business district problems (4, p. 126).

Dealing specifically with non-retail functions, Lowe observed that: "Little is known about the relative importance of retail and non-retail functions in the central district and whether non-retail functions downtown are gaining or losing importance..." (5). The need exists for studying the

changing functions of the CBD and furthermore, for developing an appropriate methodology for analyzing the CBD.

Scope and Purpose

This study seeks to examine the changes that have taken place in the functions performed by the CBD of Lafayette, Indiana during the period 1950-1967. Functions can be defined as: (1) the multiplicity of activities performed in the CBD such as trade, service, light manufacturing, transportation and communication, and housing; and (2) the major roles assumed by the CBD in the urban area. Two of the roles which are examined in this study are the importance of the CBD as a tax base and its role as an employment center. In choosing the time-span 1950-1967, two recent periods in the development of the CBD were noted. The first spans the years of rapid urbanization following 1910 and ends in the depression and the wartime. The second is post-war and is characterized by the rapidly increasing use of the automobile, by the growth of the suburbs, and by the appearance of the integrated planned shopping centers (8). From the standpoint of a CBD analysis, this second period is more pertinent as it has resulted in more dramatic CBD changes. The time-span (1950-1967) chosen for this study satisfactorily includes this second period.

Numerous aspects of functional change present encouraging possibilities in a study of this kind. Four of these are considered in this study: space-use, location, assessed

valuations, and employment. Limiting the study to these four aspects does not in any way deny the importance of the other aspects such as retail sales, daytime population, traffic, and aesthetics.

Within this framework, the study is conducted with the following specific objectives:

1. To develop an appropriate methodology for examining CBD functional changes in small sized urban areas.
2. To study, in the context of the entire urban area, the changing roles of the CBD by relating its gross functional changes to a number of broader changes in the urban area at large.
3. To study, on the microlevel, the internal changes in the functions of the CBD (both core and fringe) by examining the nature and magnitude of aggregate changes in different CBD functions and by relating these changes to each other both quantitatively and qualitatively.
4. To provide sufficient information on the CBD conditions (past and present) for use in local planning activities.

Current Methodological Approaches

In his extensive review of CBD literature, Weiss reports that "...four distinct approaches have been attempted in describing and measuring the economic and physical characteristics of the CBD" (9, p. 7). These approaches are: (1)

retail sales attraction, (2) land values, (3) daytime population, and (4) functional classification.

In the first approach, retail trade volume is taken as an indicator of the economic vitality of the CBD. The approach has been successfully used in a number of studies (10, 11, 12), yet it still has several limitations. Because such an approach depends almost entirely on data reported in the Censuses of Business (13), it is bound to use census tract delimitations of the CBD despite their inappropriateness in many cases (14). Moreover, in the case of smaller sized urban areas for which no data is reported in the Census of Business (at least to date), the approach is practically impossible.

In the second approach, land value is used as a measure of the relative importance of central locations. Hoyt's often-referenced study on land values in Chicago showed that there is a high correlation between suburbanization trends and the relative decrease in CBD land values (15). Murphy and Vance used land value as one of their criteria for delimiting the CBD (16). Horwood and Boyce observed an extreme concentration of highly valued land in the central core of the CBD. They noted that there was not a smooth gradient of land values as the distance increases outwards from the center. Instead, they maintained that "...this function has a discontinuous surface, perhaps with a very rapid fall-off as the boundary of the [central] core is passed" (14, p. 5). This rapid fall-off becomes especially useful as a means of

identifying a central core boundary. Data on land values (market sales prices) are not ordinarily easily accessible especially for previous years. Assessed valuations, being more readily available in transfer records, are being widely accepted as a satisfactory substiture though Hoyt and others have expressed reservations concerning this practice.

The development of the third approach: daytime population, is generally attributed to the urban ecologists. The prime source of data for such studies has been the origin-destination surveys conducted in a large number of urban areas in connection with comprehensive transportation studies. Clusters of employment, trade and service activities, and other functions can be located since origin-destination data usually include origins and destinations of trips as well as their time, purpose, and mode of travel. Numbers of persons entering and accumulating within the CBD has also been the focus of many of these studies (17, 18).

The last approach uses the examination of CBD activities according to their functional role as well as their spatial setting within the CBD. Haig's study in the New York Regional Survey in 1927 is generally recognized as the first major study viewing CBD changes in terms of functions (19). The method has come to be recognized in the literature as the "directory type" functional study. Along similar lines, Ratcliff studied the Madison CBD. His main objective was "...to examine the functions of the central area, to reveal and explain changes in such functions over time, and to base

a forecast of the future role of the central area on the perspective of functional shifts" (20, p. 8). To do this, Ratcliff traced the changes taking place in the number of CBD establishments (as listed in the City Directories) at approximately five-years intervals from 1921 through 1950. The study presented meaningful results concerning the essentials of CBD change. However, two drawbacks deserve attention. First, the study covers only street floor occupancies. While Ratcliff recognizes the shortcomings of this limited coverage, he gives no clear explanation for omitting establishments in upper floors. Second, the validity of measuring functional change by only one criterion; namely, number of establishments, is obviously questionable. Unlike Ratcliff's study which was initially designed to trace change over time, Murphy and Vance developed a technique for delimiting the "hard core" of the CBD (referred to in this study as the central core) using one fixed point in time. By subjectively classifying functions into central business functions and non-central business functions, they delimited the "hard core" by including inside its boundary all blocks in which the percent of central business functions was higher than an arbitrarily chosen value (16). Although admittedly arbitrary, the technique has the virtue of standardized application and has allowed valid comparisons of a variety of CBDs.

The current methodological approaches to CBD analysis have been reviewed. While there is a general agreement among CBD analysts regarding the need to study CBD functional

changes over time, there does not seem to be any general acceptance of a study methodology. The functional approach comes closest to providing an appropriate methodological orientation to this present study. Within its framework a detailed study procedure was developed to achieve the overall objectives.

Procedural Outline of Study

In small communities and for the purpose of tracing changes over time in CBD functions, a simplified and easily applicable procedure is almost a necessity. The feasibility of a CBD study of this kind in a small community is greatly influenced if not entirely dependent on the availability of a simple, inexpensive, and straightforward procedure.

In the next chapter, current techniques of CBD delimitation are reviewed. A simplified method is then used to delimit the outer boundary of the CBD. The core-fringe concept is discussed and a central core (within the CBD) is identified. The core-fringe distinction provides the basis for including the locational variable in the study.

Detailed data on space-use activities, assessed valuations, and employment were collected for all blocks within the study area and for the years 1950, 1957, 1960, 1963, and 1967. Less detailed information was also obtained for the urban area at large to make possible a number of analyses concerning the changing importance of the CBD in the urban area. Chapter III deals with sources of data and methods of data

collection and classification.

Data thus obtained and summarized are subjected to analyses in Chapter IV. A broad analysis is made first by relating gross changes in the CBD as a whole to changes in the entire urban area. Detailed data on the relative internal changes in CBD functions are then analyzed on three different levels of detail. Findings are correlated and discussed and a number of generalized interpretations are offered. The conclusions are summarized in Chapter V.

CHAPTER II. DELIMITATION OF THE CBD AND THE CENTRAL CORE

Current CBD Delimitation Techniques

In part, problems of delimiting the CBD arise from the lack of a generally accepted definition of what constitutes the CBD. While some writers have stressed the mix of activities in the CBD (19), others argued that it is the intense concentration of activities rather than the mix as such, which characterizes the CBD (23). To others still, the CBD is but a small portion of the city center, basically noticeable for its variety of retail activities (21). Analysts have often pointed out the vagueness of the CBD and the indefiniteness of its boundaries.

In an investigation on what methods are used by planning agencies in delimiting the CBD, Murphy and Vance found out that, in most cases, the area chosen was that generally understood by the local community to be the CBD. They also reported a large variety of other methods that were based on land values, non-residential uses, shop rents, volume of sales, population distribution, patterns of employment, movement of pedestrians, traffic flow, and types of establishments located at the edge of the CBD (16). The authors concluded that none of these methods permitted comparative analysis

between CBDs since they lacked standardization of delimitation criteria and procedures. Consequently, they set out to develop a delimitation system that was practicable and intuitively strong. The CBD, in their proposed technique, is delimited by including all blocks that fulfill two central business indexes. These indexes are:

1. The Central Business Height Index (CBHI), which is the total net floor area of central business uses (as defined in a subjective classification of uses as central business and non-central business) in a block divided by its net ground floor area;
2. The Central Business Intensity Index (CBII), which is the ratio of floor area used by central business activities to all net floor area in a block.

A block is considered to fall within the CBD if its CBHI is 1.00 or more and its CBII is 0.50 or more (16).

While the technique succeeds in providing a standardized application and in allowing valid comparisons of a number of CBDs, it is still criticized for its arbitrary definition of "central business uses" (14). Similar to most other methods, the Murphy and Vance technique does not offer any objective basis for the choice of a particular set of cut-off points within the range of values that the proposed indexes can assume.

From a review of current CBD delimitation techniques, a number of observations and concepts can be noted:

1. The boundary of the CBD is zonal in character. Its actual single line representation, therefore, can at best be only an approximation.
2. In the absence of a quantitative definition of what constitutes the CBD, delimitation techniques are bound to depend on some measures of arbitrariness in setting cut-off points.
3. The use of a preconceived classification of uses into central business and non-central business invalidates any subsequent investigation of the internal functions of the CBD; it sets the results of the investigation before it is conducted.
4. The CBD boundary does not remain fixed over time. While, in a sense, this is true, any attempt to take account of this dynamic aspect of the boundary would leave the analyst without any fixed datum line for comparisons over time.

With these points in mind, the following simplified delimitation method was developed and the Lafayette CBD boundary was established.

Delimitation of the CBD

The geographic location of the CBD of Lafayette in relation to the entire urban area is shown in Figure 1.

A number of possible delimitation criteria were considered. Of these, three were examined closely: assessed valuations on land, floor area ratio (total floor space in a block

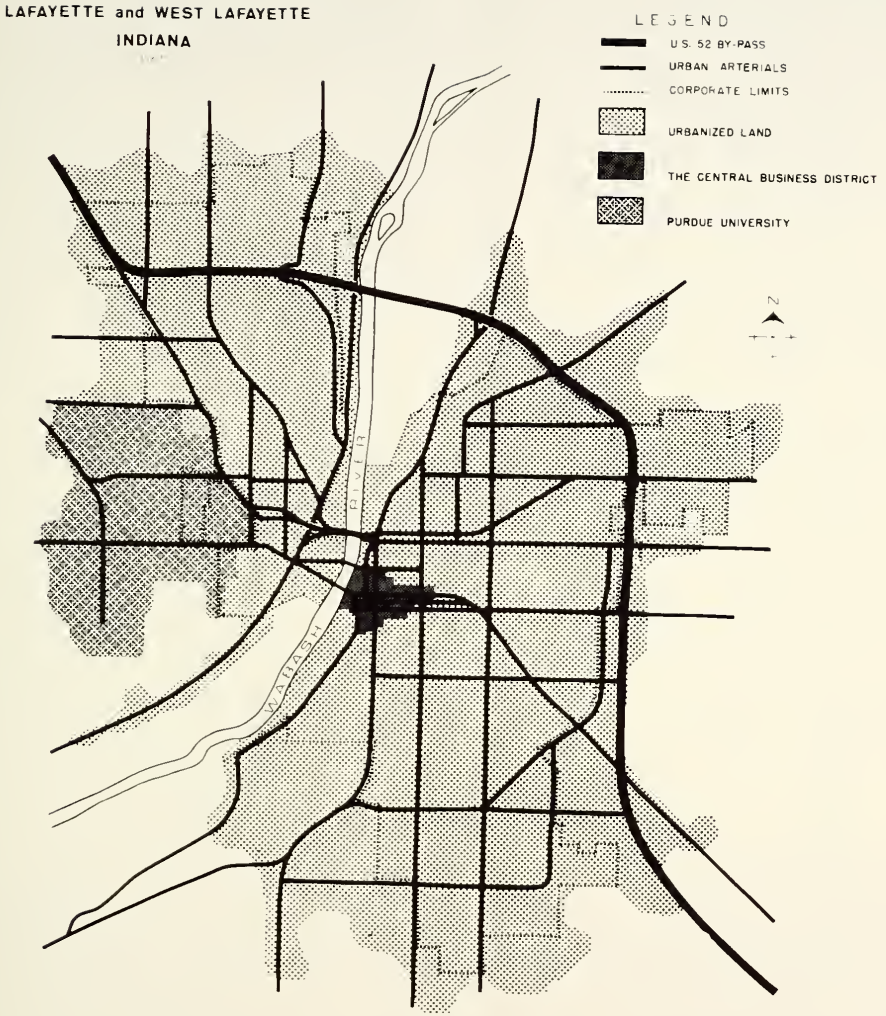


FIGURE 1 – LOCATION OF THE C.B.D. IN THE URBAN AREA

block divided by its ground area), and percentage of space devoted to non-residential uses.

From a detailed 1967 aerial photo, a first approximation to the CBD boundary was established on the basis of types of structures. Figure 2 shows this approximate boundary. The conservative approach taken in establishing this preliminary area insured that the final delimited area would be completely included. Data on assessed valuations on land in 1967 were obtained on parcel basis for all blocks within the preliminary area. The average assessments per square foot of taxable land were then computed for each of these blocks. The spatial distribution of these averages over the given area was examined. Apart from a noticeable decrease in the average assessed valuations along the boundary of what was later identified as the central core, no further perceptible changes were observed in the vicinity of the approximate boundary of the CBD. This indicated that while assessed valuations on land may be used to delimit the central core, their usefulness as a basis for delimiting the CBD boundary is very limited.

Floor area ratio showed little promise as a delimitation criterion. The greatest number of buildings in the CBD are two or three stories high which is not so different from the surrounding area.

The percentage of non-residential uses proved to be a satisfactory and straightforward basis for delimiting the CBD. For every block within the preliminary area (Figure 2)

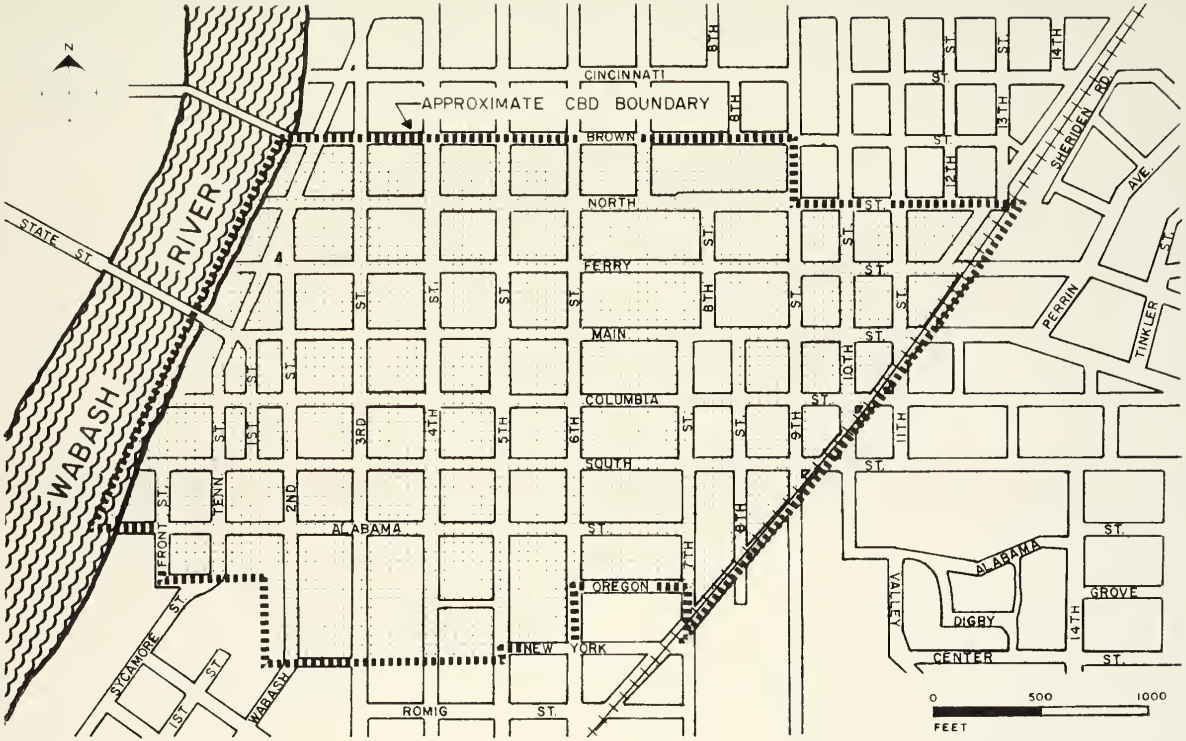


FIGURE 2 – A FIRST APPROXIMATION TO THE C.B.D. BOUNDARY

for 1967, two percentages were computed: (1) the percentage of total floor space in all floors devoted to non-residential uses, and (2) the percentage of total floor space on the street floor devoted to non-residential uses. Of the two approaches to calculating non-residential uses, the first which included upper floors was more difficult to use but provided a more realistic delimitation. There are blocks which have residential uses only in the upper floors and by using the second method would indicate a very high percentage of non-residential use, when in fact they are primarily residential. The only condition under which the second method could be more meaningful would be where the street floor space was used as residential with business or office uses on the upper floors. This would be an unusual circumstance. Accordingly, it was decided to use the percentage of total floor space in all floors devoted to non-residential uses as a basis for delimiting the CBD.

An individual block was considered to qualify for inclusion in the CBD if at least 45 percent of its total floor space (on all floors) was devoted to non-residential uses in 1967, and if it was contiguous to the rest of the CBD. The 45 percent cut-off point was arrived at as follows. A map showing the blocks in question and their percentages of non-residential uses was analyzed for the purpose of determining whether or not some pronounced changes existed in these percentages and the values at which they occurred. An

appreciable change was observed at 50 percent. The final choice of the 45 percent cut-off point was made on the basis of a detailed investigation of the actual space-uses in each of the marginal blocks (having percentages close to 50) and an evaluation of how critical it would be to include them or exclude them. The CBD boundary thus established is shown in Figure 3.

The CBD Core-Fringe Concept

In the focus of the CBD, more intensive use of space, higher land values, heavier pedestrian traffic, and generally taller buildings indicate the presence of a central core. In this core, CBD characteristics are found in their most intense form. The fringe is the area of the CBD surrounding the central core. Activities are located here that need central locations but are unable to compete for central core locations. The fringe, therefore, exhibits less intense characteristics especially along its outer edge. The distinction between the central core and the fringe is, therefore, one of degree, and not of kind.

Jurkat recognized the core-fringe concept in his St. Louis study in 1959 (24). Horwood and Boyce gave detailed consideration to the properties, definitions, and general characteristics of the core and the frame as well as the primary differences between them (14).

The distinction between core and fringe (or frame) is particularly useful in tracing CBD functional changes over

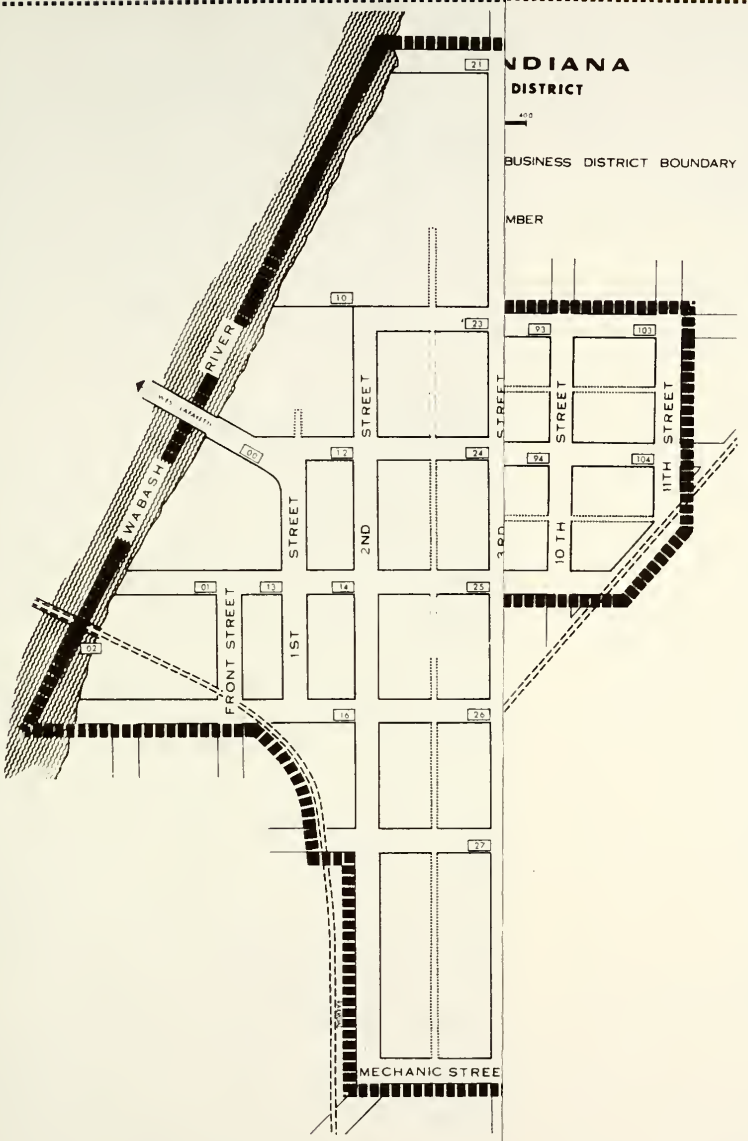


FIGURE 3 — THE C.B.D

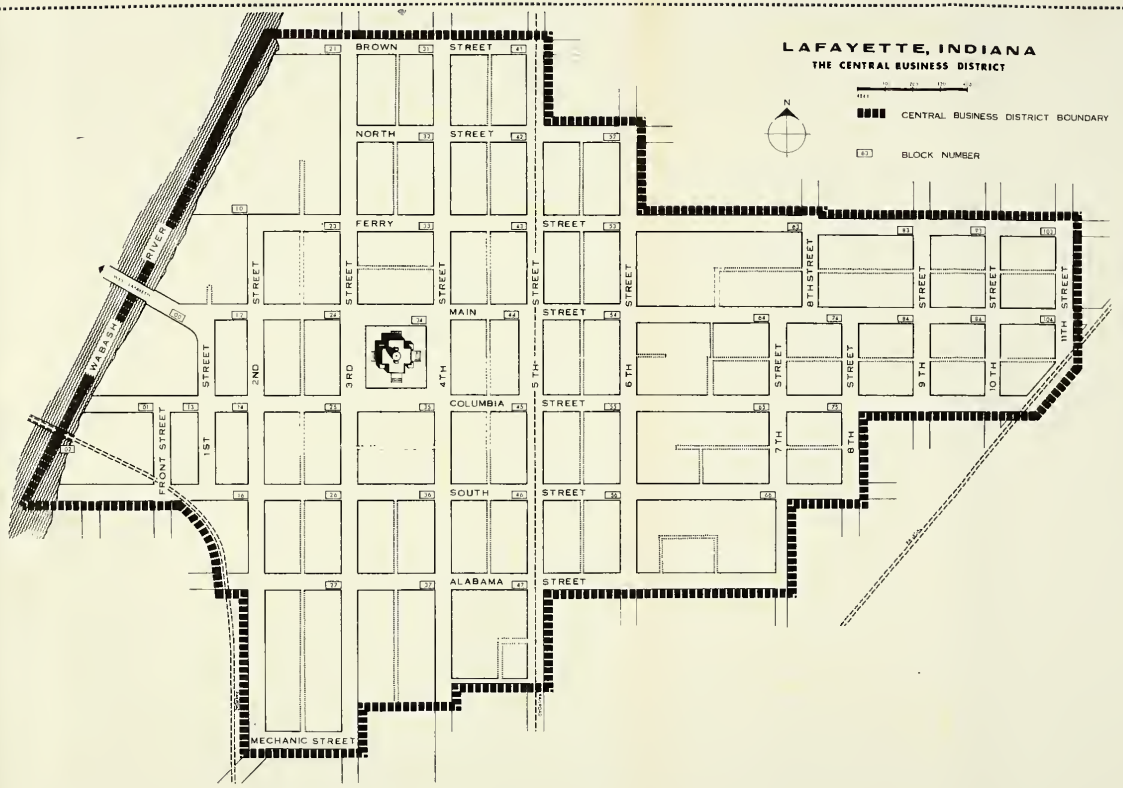


FIGURE 3 — THE C.B.D. BOUNDARY

time. The uniqueness of the central core is derived basically from its matchless location. The appreciable difference between the locational value of the core and the fringe accounts for most of the other tangible differences in their properties and characteristics. The core-fringe distinction, therefore, provides an appropriate base for analyzing the locational concentrations and/or shifts in CBD functions over time.

Delimitation of the Central Core

While building heights, pedestrian movements, and concentrations of specialized activities may be used as symptomatic indicators of central core characteristics, one may use land values directly to delimit the central core. In fact, tall buildings, intensive use of space, high concentrations of pedestrians and specialized activities are all attributes of high land values in the central core.

In this study, assessed valuations on land were used as a basis for central core delimitation. For every quarter block in the CBD, data on assessed valuations on land (already obtained on parcel basis) were averaged over the taxable land area of the quarter block. The highest average assessed valuation per square foot of taxable land was set equal to a land value index of 100 and all other averages (for all other quarter blocks) were related to it. This was done for each of the five years considered throughout the study and referred to later as the reference years. These

years are 1950, 1957, 1960, 1963, and 1967.

The distributions and the frequencies of these land value indexes over the entire CBD area were analyzed. A significant decrease was observed in index values as they went below 30. A noticeable increase in the frequencies of quarter blocks having land value indexes less than 30 was also observed. This suggested the use of a land value index of 30 or more as a basis for delimiting the central core. For each of the five reference years, the area comprising all quarter blocks satisfying this condition was delineated. The five areas were superimposed and the degrees to which they corresponded were evaluated. No substantial variations were observed between these five delineations. The relative consistency, over the years, in the boundaries established by this procedure confirmed the validity of using land values as a central core delimitation criterion. As a further confirmation an area comprising all quarter blocks in which 65 percent or more of the street floor space was devoted to trade and service functions (excluding gas stations) in 1967 was also delineated and superimposed over the five previously mentioned areas. The value of 65 used here was derived at in a similar manner of other limiting values. On the basis of these six areas, the final central core boundary was defined. Figure 4 shows these six superimposed areas as well as the final central core boundary.

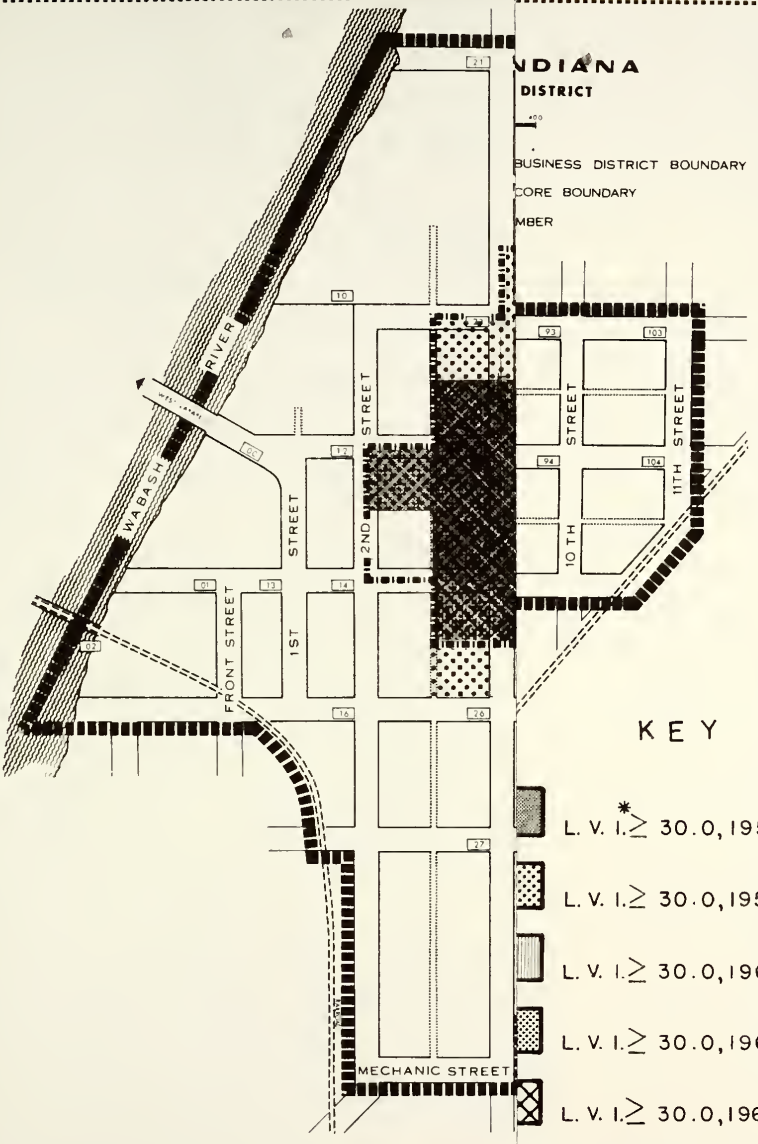


FIGURE 4 — DELIMITATION
CRITERIA A

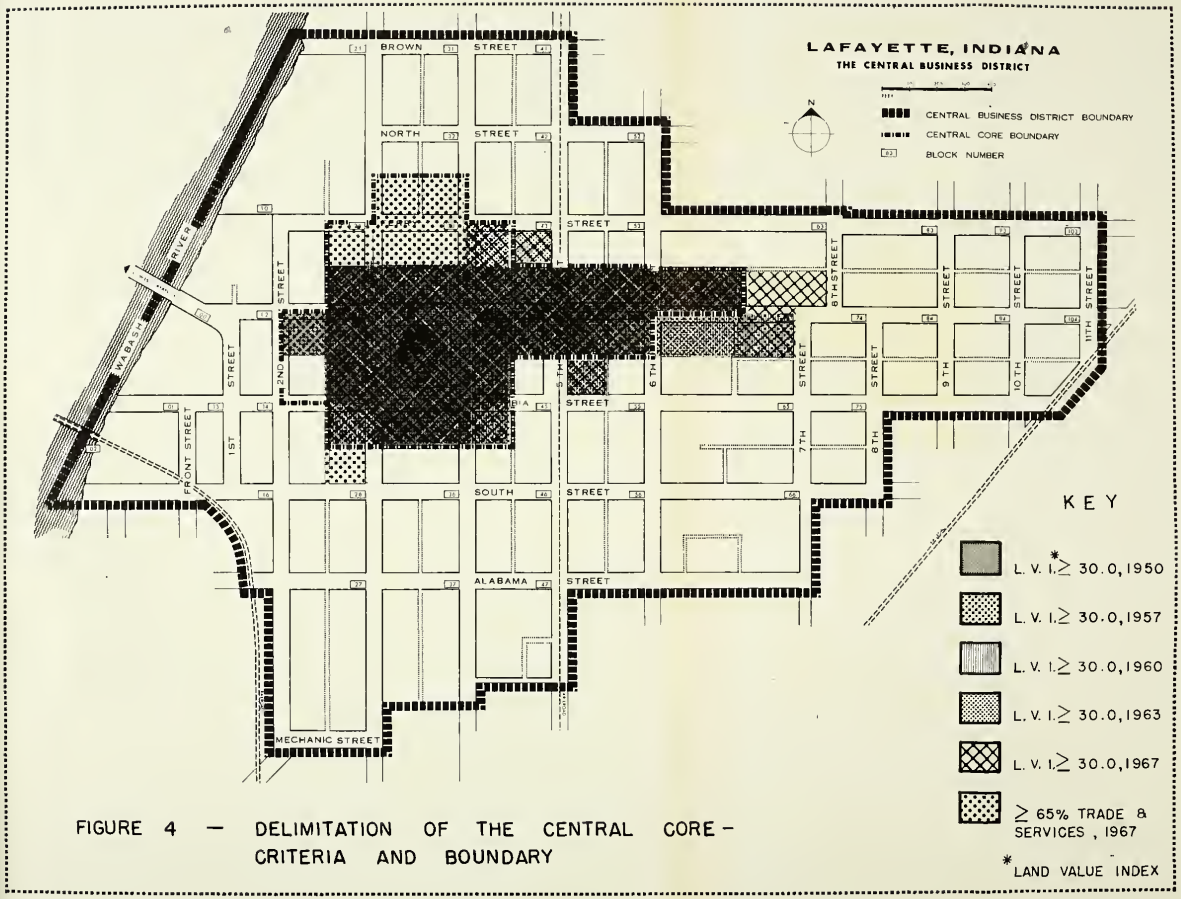


FIGURE 4 — DELIMITATION OF THE CENTRAL CORE – CRITERIA AND BOUNDARY

CHAPTER III. DATA COLLECTION

General Considerations

Data collected for this study fall into three broad classes: space-use, assessed valuations, and employment. This section discusses generalities related to choice of data sources, of reference years, of space-use classifications, and of complete enumeration and sampling methods.

Data Sources

Most of the data were collected from sources which are typically available to the general public and which can usually be found in most similar urban areas. Attention was also given to compatibility between definitions and measurement units used in different sources as well as the reliability and completeness of individual sources. The main data sources thus chosen were:

1. R. L. Polk City Directories.
2. Sanborn fire insurance maps and correction slips.
3. Aerial photographs.
4. County Auditor's transfer books.
5. City plat maps.
6. State Employment Security Division records.

Supplementary data sources included:

1. Chamber of Commerce reports.
2. Fire Department inspection reports.
3. Post card questionnaires.

Reference Years

The "historic" recording of CBD data began with the year 1950 and was carried through for 1957, 1960, 1963, and finally for 1967. The choice of the above listed reference years was guided by two factors. First, almost all of the present outlying shopping centers have been put into operation during the period 1957-1964. Because of the fundamental changes that could be expected in the CBD due to the appearance of these shopping centers, attention was focused on this period (1957-1964) by including therein, some closely spaced reference years. Second, the choice of a particular reference year was made according to how complete a data set could be obtained for this year.

Space-Use Classifications

Four space-use classification systems were reviewed. Murphy, Vance, and Epstein proposed a system containing 34 retail business uses, 18 service-financial-office uses, and 8 non-central business uses (16). The objections to this system were discussed in Chapter II. The method, by Alderson and Sessions for the Philadelphia CBD study, was specifically developed to enable the forecasting of future space needs

(25). Weiss proposed a functional classification system based on 8 major categories which were broken down into 36 detailed functional classes (9). The above three systems did not provide sufficient breakdowns to correctly describe typical CBD uses.

A "standard system for identifying and coding land-use activities" was proposed in 1965 by the Housing and Home Finance Agency and the Bureau of Public Roads. The system includes 9 one-digit activity categories, 67 two-digit categories, 294 three-digit categories, and 772 four-digit categories (26).

The categories at the four-digit level identify space-use activities in the greatest detail, and as these are aggregated up into the three-, two-, and one-digit levels, the categories become more generalized. As such, the system permits four different levels of detail depending on the purpose of the study. Furthermore, when appropriate, it allows the reorganization of detailed categories under newly developed general classifications. Accordingly, the standard system for identifying and coding land-use activities was used as a basis for developing a system to fit this study.

The adapted space-use classification and coding system used is composed of 8 one-digit categories, 42 two-digit categories, and 107 three-digit categories. Appendix I gives the descriptions of these categories as well as their assigned numeric codes.

Complete Enumeration and Sampling

The establishment was used as the unit for collecting space-use data. Since the number of space-use categories (on the three-digit level) was so large compared to the total number of establishments in the CBD, it was found that the size of a statistically representative stratified random sample of establishments would not be substantially less than the size of the whole population (of establishments). Space-use data, therefore, were collected for a complete enumeration of CBD establishments. It is conceivable that in larger CBDs, sampling might be more appropriate.

Data on assessed valuations were also collected for a complete enumeration of real estate properties in the CBD. The multiplicity of variables affecting the valuation of individual real estate properties, and their uniqueness (in a locational sense), makes sampling difficult and unreliable.

For employment data, however, a number of data items were collected on the basis of a stratified random sample of establishments.

Space-Use Data

An establishment is defined as a unit of space-use having a definite location (address) and a recognizable activity. The R. L. Polk City Directories (27-31) were used to record CBD establishments by address and type of activity. For each quarter block included in the study area, a complete enumeration of establishments was obtained. This was done for each

of the five reference years. Each establishment was identified by the quarter block to which it belongs, by the floor (or floors) on which it is located, and by the type of activity it performs. These activities were then given three-digit codes using the space-use classification and coding system in Appendix I.

Floor spaces used by individual establishments were measured from Sanborn fire insurance maps. These maps give, for each structure, a large variety of useful details including the number of stories, the location of stairs and elevators, the street number (or numbers), and the general use such as store, flat, residence, parking, or vacant. The Sanborn maps are updated annually by pasting correction slips over the parts which are changed. A set of 1967 maps as well as sets of correction slips for 1950 through 1967 were obtained from the Sanborn Map Company. By accumulating these corrections in a reverse manner, i.e., by pasting 1966 correction slips over 1967 maps, then pasting 1965 correction slips over the corrected 1966 maps, and so on, sets of corrected "historic" maps were prepared for each of the five reference years.

For the establishments recorded from the City Directories, floor spaces and associated parking areas were measured from the corrected Sanborn maps. Detailed aerial photographs flown by the Agricultural Stabilization and Conservation Service, U. S. Department of Agriculture in the reference years were constantly used to crosscheck the accuracy of the

corrected maps. In few cases, no information were available either in the maps or in the City Directories as to the occupancy or vacancy of some upper floor spaces. The Fire Department inspection reports proved helpful in providing most of the missing information.

Space-use data thus collected (per CBD establishment) included: reference year, location by quarter block, space-use code, floor space on street floor, floor space on other floors (basement and all upper floors), and type and area of parking associated with the establishment (private, customer, or public).

For the entire urban area (as defined by the corporate limits of Lafayette and West Lafayette), for each of the reference years, the total numbers of business establishments (one-digit categories 2 through 7) were obtained from the City Directories. Information on the principle shopping centers in the urban area were provided by the Greater Lafayette Chamber of Commerce. The information included the date on which each shopping center was first opened for business and its total floor space for each of the reference years.

Assessed Valuations Data

Data on assessed valuations were collected on the basis of real estate property parcels. A parcel is defined as all contiguous property transferred to its most recent owner (or owners) by one transaction. The City plat maps show the limits of these parcels as well as the names of their most

recent owners. They give, for each parcel, the assessed valuations on land and on improvements, the name(s) of the previous owner(s), and the dates of transfer. In cases where assessed valuations changed during the period of one ownership, the previous assessments are shown crossed and the new ones are inserted below. Dates of assessment changes within the period of one ownership are not consistently recorded in the books but are almost always retrievable through the assistance of the Auditor's office employees.

Transfer books are catalogued by increments of time. Each book covers about five to ten years. If the column showing the name(s) of the previous owner(s) is not filled, then the property in question had not been transferred during the period covered in this book. Earlier transfers might be found in preceding books. By tracing the transfers in the ownership of a parcel, changes in its assessed valuations can also be traced back.

Assessed valuations data thus collected (per property parcel) included: reference year, assessed valuation on land, assessed valuation on improvements, area of taxable land, and unassessed properties (exempt of taxations). Total assessed valuations on land and improvements for the entire urban area for each of the reference years were provided by the Greater Lafayette Chamber of Commerce.

Employment Data

Records kept by the Indiana Employment Security Division provided the major source of employment data. These records give quarterly average employment by employer for all employers with four or more employees. Prior to 1956, these records gave the same information but only for employers with eight or more employees. Hence, not all CBD employers are listed in the Employment Security records (E.S. records). To complete the employment data, average employment figures for employers not included in the E.S. records were estimated. The procedure used to arrive at these estimates was as follows:

1. A post card questionnaire was sent to a systematic random sample of 40 (out of 417) CBD employers not listed in the E.S. records for 1967. These are all employers with less than four employees. The questionnaire asked for the average number of employees in 1967 and in 1950. The respondents were 32. Out of these, 21 employers had less than four employees in 1950. The two averages estimated from the sample questionnaire were found almost equal (2.1 in 1967 and 2.2 in 1950).
2. Changes in the employment of 50 CBD employers listed in the E.S. records were analyzed over the period 1950-1967. It was observed that employers with the smallest number of employees retained an almost

constant employment throughout the period, and that the larger the number of employees, the greater were the changes in employment. This analysis confirmed the results of the sample questionnaire. At the same time, it supported the assumption that the employers with four or more but less than eight employees retained a constant average employment between 1950 and 1957.

3. From the 1957 E.S. records, the average employment for employers with four or more but less than eight employees was obtained. This average, according to the results of the above analysis, was assumed the same for 1950.
4. For each of the years, 1967, 1963, 1960, and 1957, the ratio of the total number of CBD employers with less than four employees to the total number of CBD employers with four or more but less than eight employees was established. The ratio was found almost constant for all four years. On this basis, it was assumed that the ratio was the same for 1950.
5. On the quarter block basis for the five reference years, the lists of CBD establishments already prepared from City Directories were used. To obtain numbers of employers from these lists, establishments with the following activities and codes were excluded: unknown [000], residential [110], parking

[461, 462, 463], unused land [910], vacant floor areas [940], and under construction [950].

6. For the employers listed in the E.S. records, the numbers of employees were assigned. For the remaining number of employers, the 1967 estimated average employment was used to compute the total numbers of employees they had in 1967, 1963, 1960, and 1957. For 1950, the number of employers having less than eight employees (i.e., employers not listed in the E.S. records) was broken down into employers with less than four employees and employers with four or more but less than eight employees. This was done by using the ratio established previously. The average employment for each of these two classes, as estimated in the previous steps, were then used to compute the total number of employees they had in 1950.

Total numbers of employers and total number of employees were thus obtained by quarter blocks within the CBD for each of the five reference years.

Estimates on the total numbers of employees in the entire urban area for each of the five reference years were also made available by the Indiana Employment Security Division.

CHAPTER IV. ANALYSIS OF DATA

Descriptive and Inferential Statistics

Descriptive or deductive statistics is used to represent and analyze data on a given population without attempting to draw any conclusions or inferences about a larger population. Through inferential statistics one seeks to analyze sample data and make generalizations, therefrom, on the population from which the sample data was originally obtained. The accuracy of the inferences and estimates thus made are evaluated objectively in terms of probability statements.

In this study, data on space-use and assessed valuations were collected for the entire population of CBD establishments and real estate property parcels. The population parameters obtained from the analyses of these data (means, proportions, or variances) are the true population parameters. Conclusions about the population, which were based on these parameters, are, thus, made under certainty. Employment data, on the other hand, do not cover the entire population of CBD employers and as such, are qualified in the following analyses by probability statements.

Changing Importance of the CBD in the Urban Area

Three indicators of the importance of the CBD in the urban area are used: numbers of business establishments (one-digit categories 2 through 7), assessed valuations on land an improvements, and employment. The CBD occupies only a minute portion of the land in the urban area. Its importance is best conceived with respect to this fact. Table 1 shows the land areas of the core, fringe, and CBD as percents of the total urban area* for 1950 and 1967.

Table 1. Land Areas of the Core, Fringe, and CBD as Percents of the Total Urban Area for 1950 and 1967.

Year	Land area as percent of total urban area		
	Core	Fringe	CBD
1950	0.34	1.56	1.90
1967	0.28	1.32	1.60

Numbers of Business Establishments

In terms of numbers of business establishments, the relative importance of the CBD has dropped during the period 1950-1967. The proportions of numbers of urban area business establishments in the core, fringe, and CBD for each of the reference years are shown in Figure 5. Both in the core and

* The area defined by the corporate limits of Lafayette and West Lafayette.

YEAR	TOTAL NO. OF BUSINESS ESTABLISHMENTS (ONE-DIGIT CATEGORIES 2 THRU 7)				CORE, FRINGE, & C.B.D. AS % OF URBAN AREA		
	CORE	FRINGE	C.B.D.	URBAN AREA	CORE	FRINGE	C.B.D.
1950	371	457	828	2615	14.19	17.48	31.67
1957	341	432	773	2494	13.67	17.32	30.99
1960	320	383	703	2568	12.46	14.91	27.37
1963	301	363	664	2661	11.31	13.64	24.95
1967	315	327	642	2734	11.52	11.96	23.48

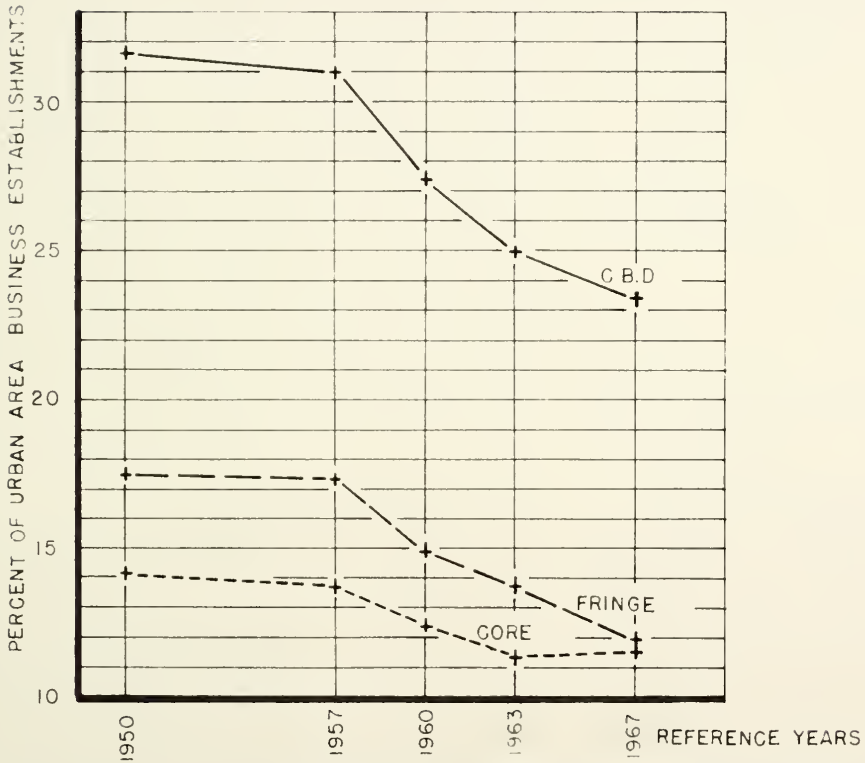


FIGURE 5 — PROPORTIONS OF NUMBERS OF URBAN AREA BUSINESS ESTABLISHMENTS IN THE C.B.D.

in the fringe, substantial decreases took place. However, the core lost less than the fringe. The decreases in the proportions of CBD businesses can, in part, be attributed to two factors. First, the process of urban growth sieves urban functions. Less specialized functions tend to follow residential expansion in outlying areas while the more specialized functions (whose numbers are far less) tend to remain located in the CBD. The core tends to lose less of its business establishments since it has "historically" been the locus of specialized functions. The greatest decrease in the proportions of CBD businesses occurred in the period 1957-1963 (Figure 5) which was also the time of rapid growth of outlying shopping centers and commercial strip developments. Second, the replacement, in the CBD, of a large number of structures by parking facilities accounts, in part, for the decreasing numbers of CBD businesses. The core is less affected since its high land values discourage the use of land for parking.

Number of business establishments, as a measure of the relative importance of the CBD, has its limitations. Alone, it gives only a preliminary idea of the changing role of the CBD in the urban area.

Assessed Valuations on Land an Improvements

The total CBD assessed valuations on land and improvements have decreased by about 26 percent during the period 1950-1967. Figure 6 shows the total assessed valuations on

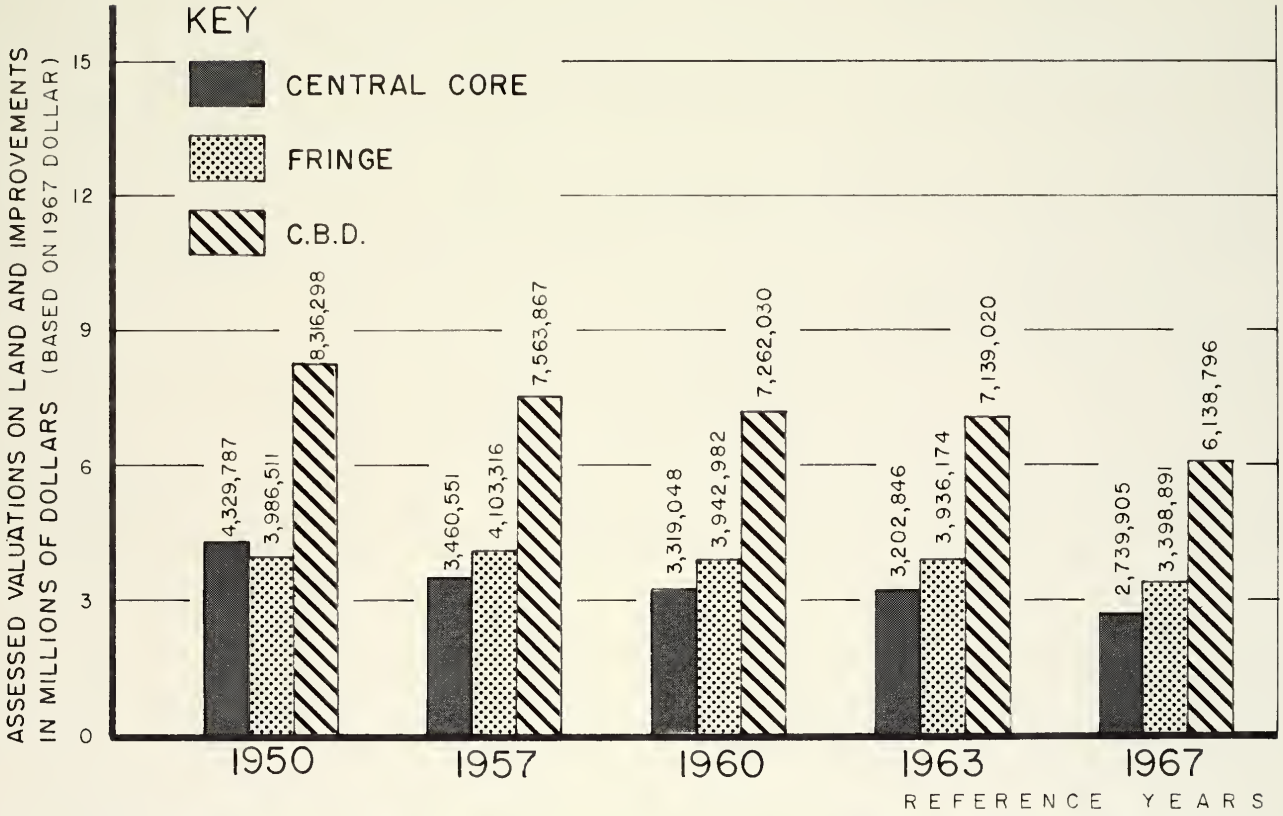


FIGURE 6 – COMPARISONS OF ASSESSED VALUATIONS ON LAND AND IMPROVEMENTS FOR CORE, FRINGE, AND C.B.D.

land and improvements for the core, fringe, and CBD for each of the reference years. Figures 7 and 8 show assessed valuations on land and on improvements separately. The valuations shown in Figures 6 through 8 are based on reference years dollar values inflated to the 1967 level according to estimates given by the Department of Commerce (32-36). Three observations can be made:

1. The core (which represents 18 percent of the CBD land area) carries an average of 49 percent of its assessed valuations on land and improvements and over 52 percent of its assessed valuations on land.
2. While the core lost about 37 percent of its assessed valuations on land and improvements, the fringe lost only 14 percent and for the period 1950-1957 showed a slight gain.
3. The assessed valuations on land dropped more heavily than those on improvements. The core lost 53 percent of its assessed valuations on land but only 19 percent of its assessed valuations on improvements. The fringe lost 23 percent on land and 9 percent on improvements.

The share of urban area assessed valuations on land and improvements carried by CBD properties has also decreased. Figure 9 shows the proportions of urban area assessed valuations on land and improvements in the core, fringe, and CBD for each of the reference years. For the CBD, the rate of

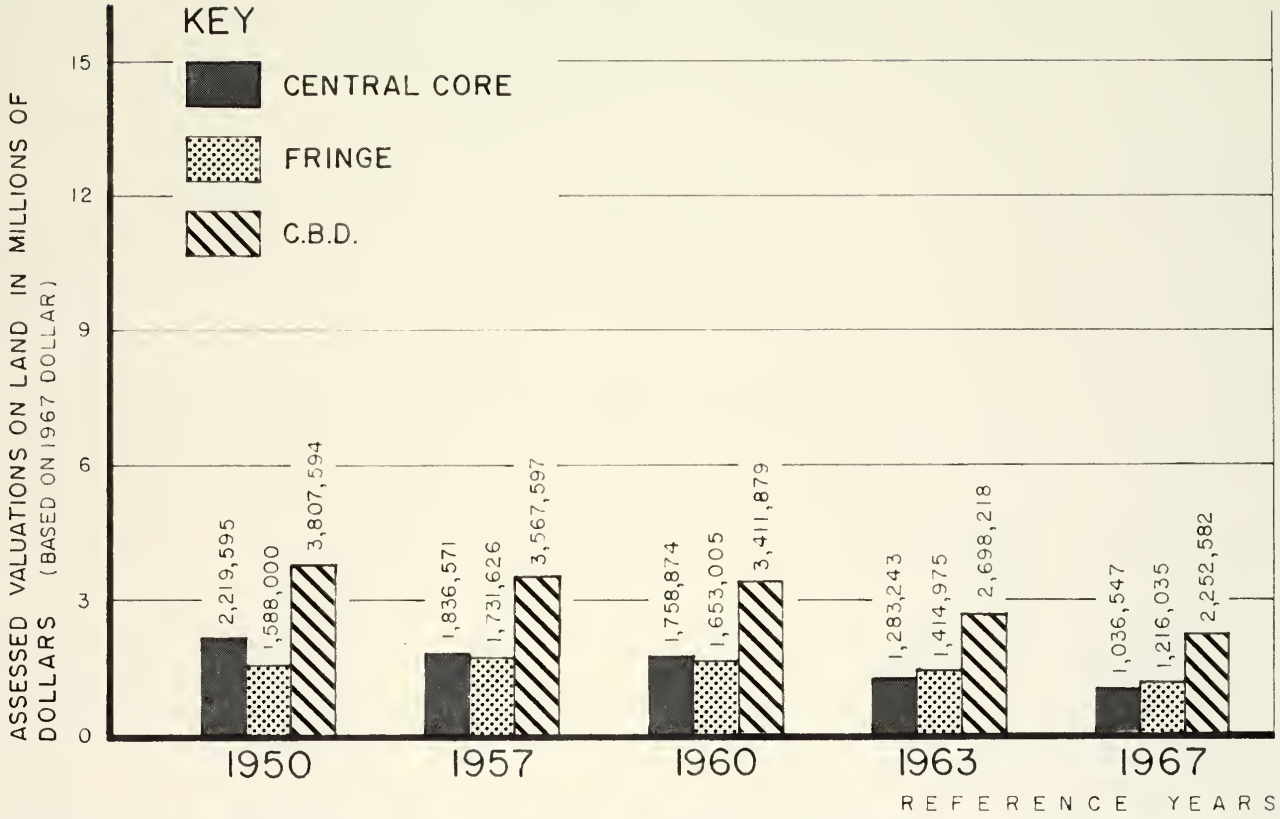


FIGURE 7 — COMPARISONS OF ASSESSED VALUATIONS ON LAND FOR CORE, FRINGE, AND C.B.D.

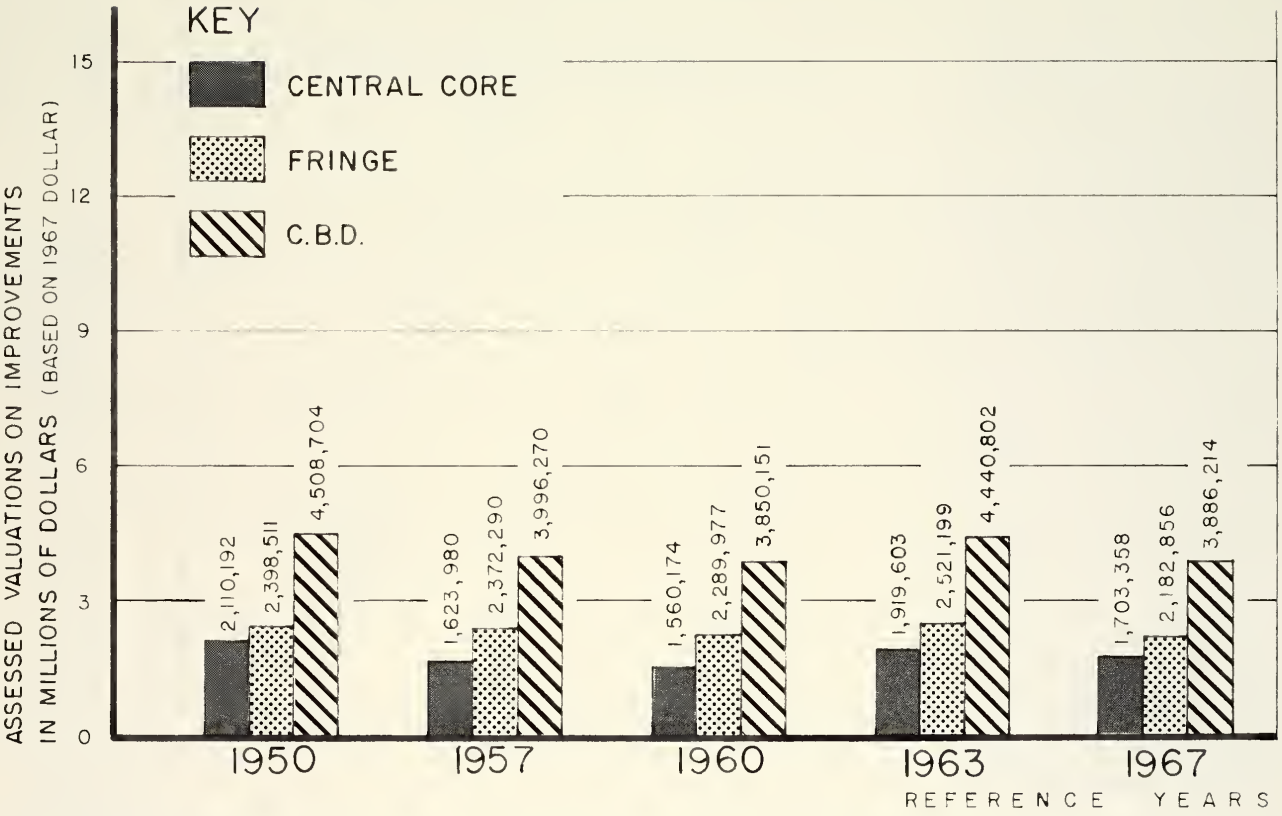


FIGURE 8 – COMPARISONS OF ASSESSED VALUATIONS ON IMPROVEMENTS FOR CORE, FRINGE, AND C.B.D.

YEAR	TOTAL ASSESSED VALUATIONS ON LAND AND IMPROVEMENTS IN REFERENCE YEAR $				CORE, FRINGE, & C.B.D. AS % OF URBAN AREA		
	CORE	FRINGE	C.B.D.	URBAN AREA	CORE	FRINGE	C.B.D.
1950	3,546,099	3,264,956	6,811,055	49,524,461	7.16	6.59	13.75
1957	3,231,140	3,831,294	7,062,434	67,019,190	4.82	5.72	10.54
1960	3,151,993	3,744,522	6,896,515	74,182,435	4.25	5.05	9.30
1963	3,030,129	3,723,911	6,754,040	82,377,640	3.68	4.52	8.20
1967	2,739,905	3,398,891	6,138,796	96,866,625	2.83	3.51	6.34

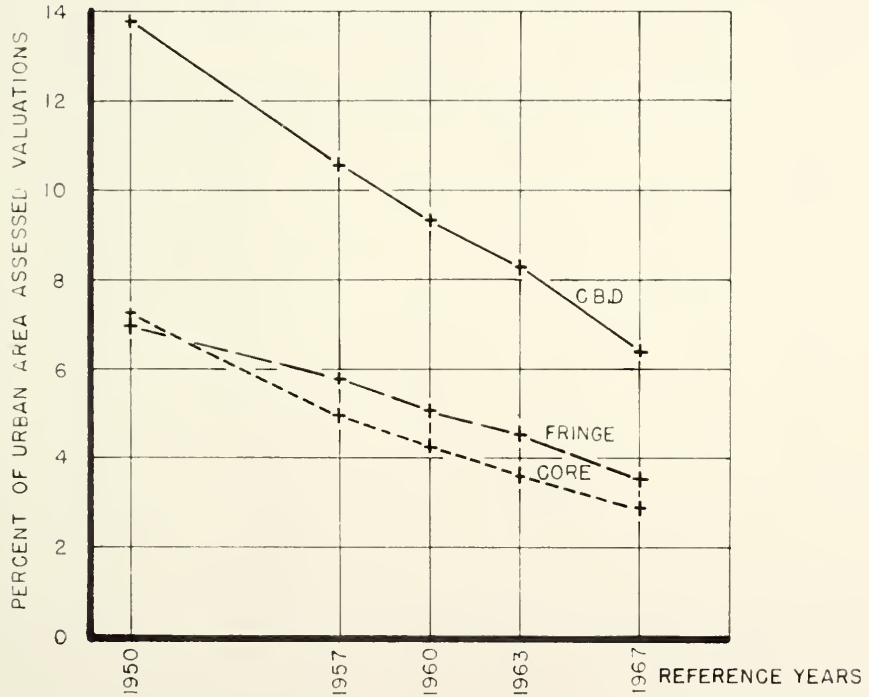


FIGURE 9 — PROPORTIONS OF URBAN AREA ASSESSED VALUATIONS ON LAND AND IMPROVEMENTS IN THE C.B.D.

decrease was almost constant. During the period 1950-1957, the core lost more than the fringe. But since 1963, the rate of decrease in the core tended to flatten out (Figure 9).

A major factor in bringing about the decline in CBD assessed valuations has been the greater freedom of intra-urban movement achieved through the use of the automobile. Businesses, no longer restricted by the nearness of a public transportation system, could locate in the now more accessible periphery. At the same time, congestion and lack of parking in the center tended to reduce the relative accessibility of the CBD. This new accessibility pattern caused a shift in the use value of real estate properties and a consequent narrowing in the gap between CBD and non CBD real estate market values. This phenomenon is partially reflected in the diminishing percent of urban area assessed valuations carried by CBD properties. Nevertheless, from the standpoint of CBD businessmen, the assessment situation is still unfavorable. Real estate tax assessors, in their attempts to maintain high CBD tax revenues, continue to use outdated CBD-non CBD average valuation ratios now far out of balance with CBD-non CBD profit earning capabilities. Table 2 shows a 1967 comparison between average assessed valuations in the CBD and in selected shopping centers in the urban area. The changing role of the CBD as a tax base, dictated by the changing pattern of intraurban accessibility, requires adjustments in CBD functions. These adjustments are only made

Table 2. Average Assessed Valuations in the CBD and in Selected Shopping Centers for 1967.

Location	Average assessed valuations on land per sq. ft. (in dollars)	Average assessed valuations on improvements per sq. ft. (in dollars)	Average assessed valuations on land and improvements per sq. ft. (in dollars)
Central Core	2.43	3.99	6.42
Fringe	0.50	0.90	1.40
CBD	0.79	1.36	2.15
Mar Jean Village Shopping Center	0.07	0.60	0.67
Market Square Shopping Center	0.07	0.47	0.54
K-Mart Shopping Center	0.01	0.19	0.20

more difficult for the businessmen by an assessment policy which underestimates the significance of these accessibility changes.

However, the importance of the CBD as a tax base can be appreciated by noting that, even after having undergone these observed declines, it still carried 6.34 percent of the total assessed valuations on land and improvements in the urban area in 1967, while occupying only 1.6 percent of the land area. The central core which occupied only 0.28 percent of the land in the urban area carried 3.51 percent of its assessed valuations.

Employment

The total number of persons employed by CBD employers has increased by about 23 percent during the period 1950-1967. Figure 10 shows the estimated total employment in the core, fringe, and CBD for each of the reference years. For the full period, the greatest increase in employment occurred in the fringe (about 54 percent) while in the core, employment dropped approximately 12 percent. Figure 11 shows the proportions of urban area employment in the core, fringe, and CBD. The relative importance of the CBD as an employment center has decreased during the study period. However, it still accounted for over 23 percent of the urban area employment in 1967.

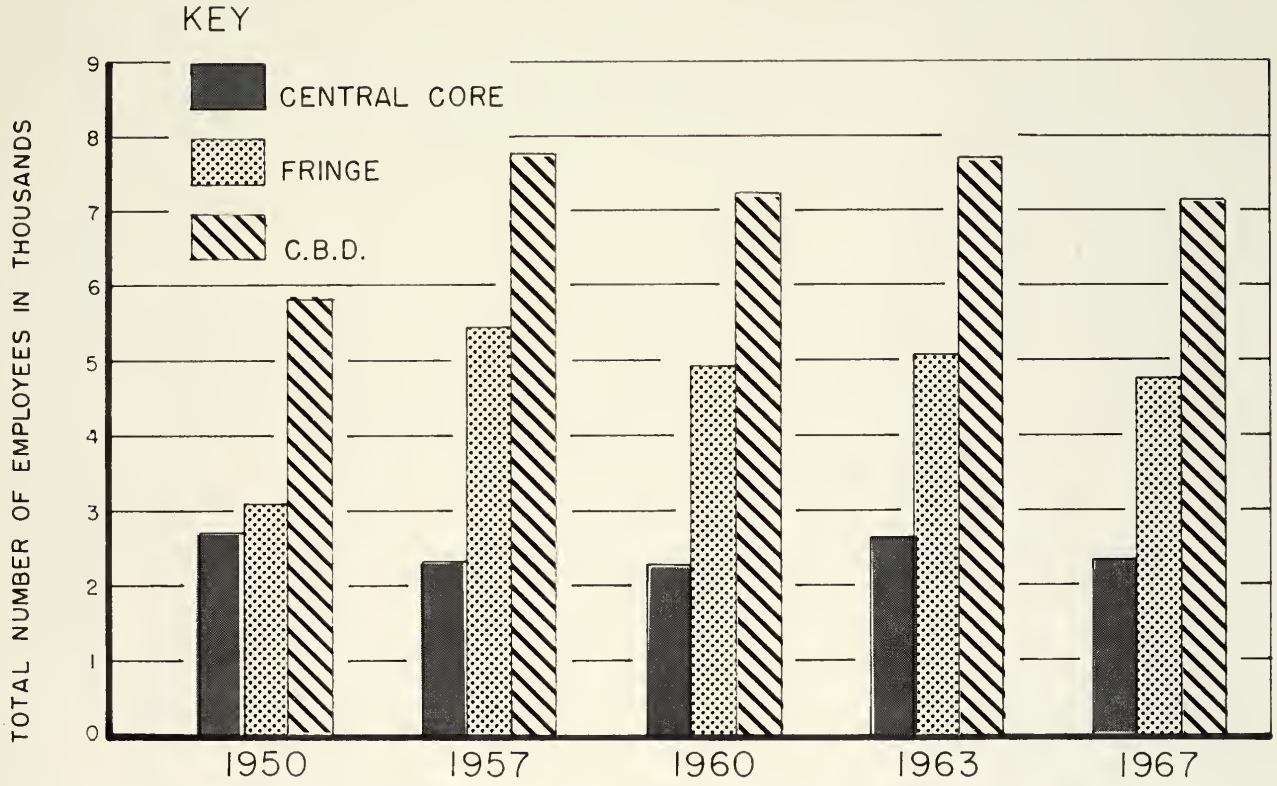


FIGURE 10 -COMPARISONS OF NUMBERS OF EMPLOYEES FOR CORE, FRINGE, AND C.B.D.

(ON THE 95% CONFIDENCE LEVEL, THE MAXIMUM EXPECTED ESTIMATION ERROR IS ±3.5% OF THE TOTALS)

YEAR	TOTAL NUMBER OF EMPLOYEES				CORE, FRINGE, & C.B.D. AS % OF URBAN AREA		
	CORE *	FRINGE *	C.B.D. *	URBAN AREA	CORE	FRINGE	C.B.D.
1950	2726	3094	5820	16,500	16.52	18.75	35.27
1957	2332	5463	7795	23,136	10.08	23.61	33.69
1960	2307	4972	7279	24,029	9.60	20 69	30.29
1963	2628	5077	7705	24,818	10.59	20.46	31.05
1967	2381	4779	7160	30,510	7.80	15.66	23.46

* ON THE 95% CONFIDENCE LEVEL, THE MAXIMUM EXPECTED ESTIMATION ERROR IS ± 3.5% OF THE TOTALS

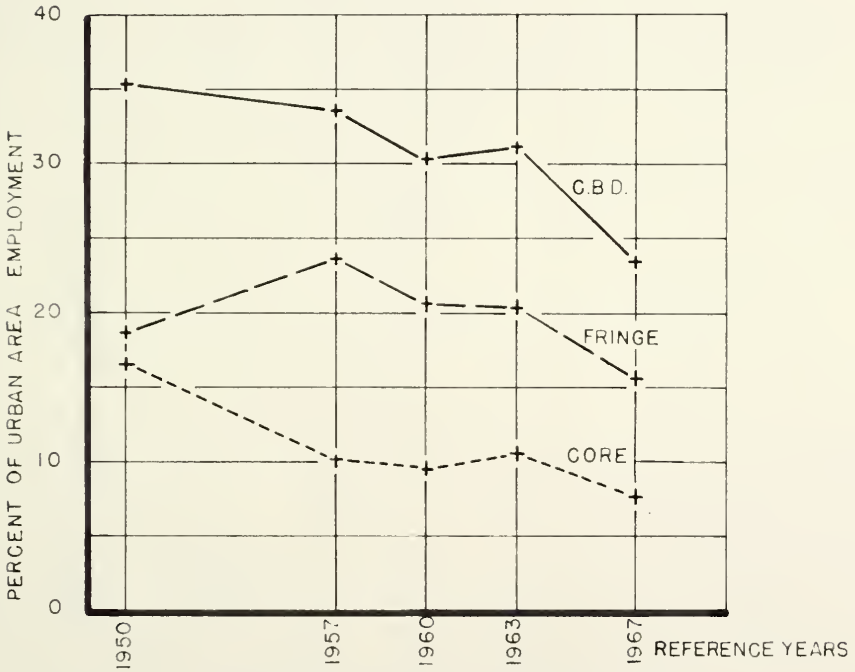


FIGURE 11 —PROPORTIONS OF URBAN AREA EMPLOYMENT IN THE C.B.D.

Internal CBD Functional Changes

Space-Use

Changes in Total Floor Space. Floor space is defined as all land areas and floor areas (roofed and unroofed) used by an activity for other than parking. Floor space is classified in the following analyses into: (1) floor space on street floor, (2) floor space on other floors (basements and upper floors), and (3) floor space on all floors (total). Parking areas are analyzed separately. Areas of streets and service alleys are not included in floor space analyses.

Total CBD floor space on all floors has decreased by 18 percent during the study period. Figures 12 through 14 give comparisons of total floor space on street floor, other floors, and all floors respectively for the core, fringe, and CBD for each of the reference years. The decrease was shared about equally by street floor space and other floor space. While the fringe lost 21 percent of its total floor space (on all floors), the core lost only 12 percent. The decrease in CBD floor space resulted mainly from the replacement of a number of structures by additional parking facilities (especially in the fringe). The changes in the relative importance of different CBD functions are best reviewed in the light of these gross changes in total CBD floor space.

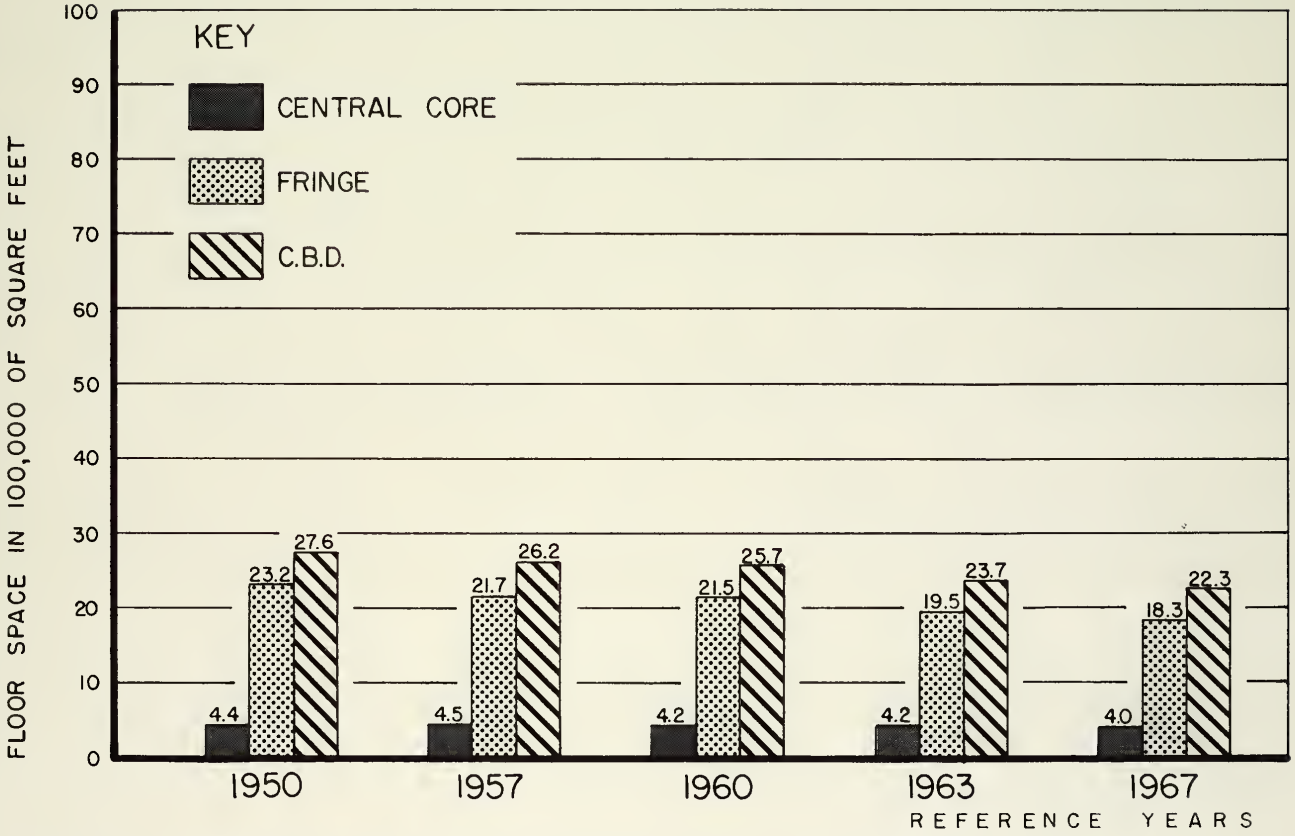


FIGURE 12 – COMPARISONS OF TOTAL FLOOR SPACE ON STREET FLOOR FOR CORE, FRINGE, AND C.B.D.

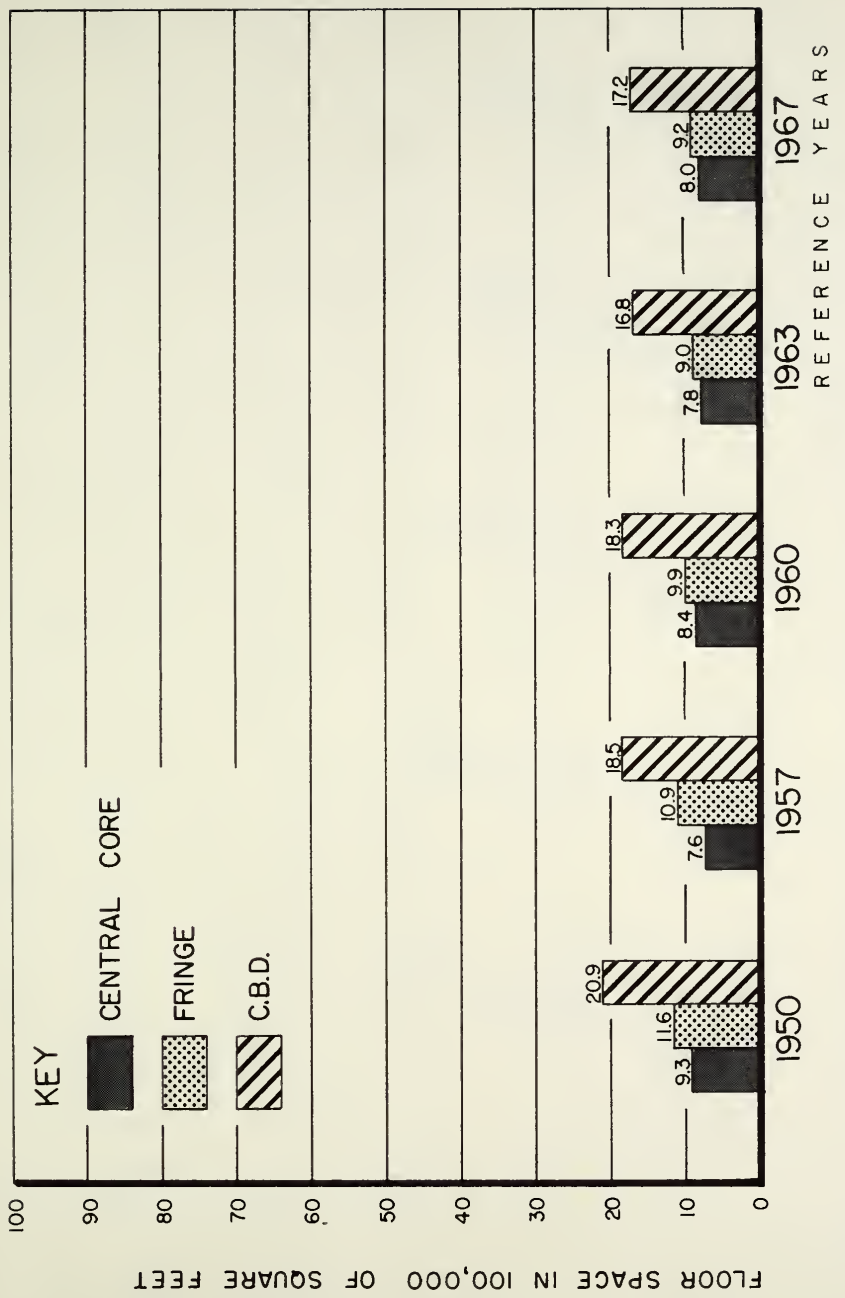


FIGURE 13—COMPARISONS OF TOTAL FLOOR SPACE ON OTHER FLOORS FOR CORE, FRINGE, AND C.B.D.

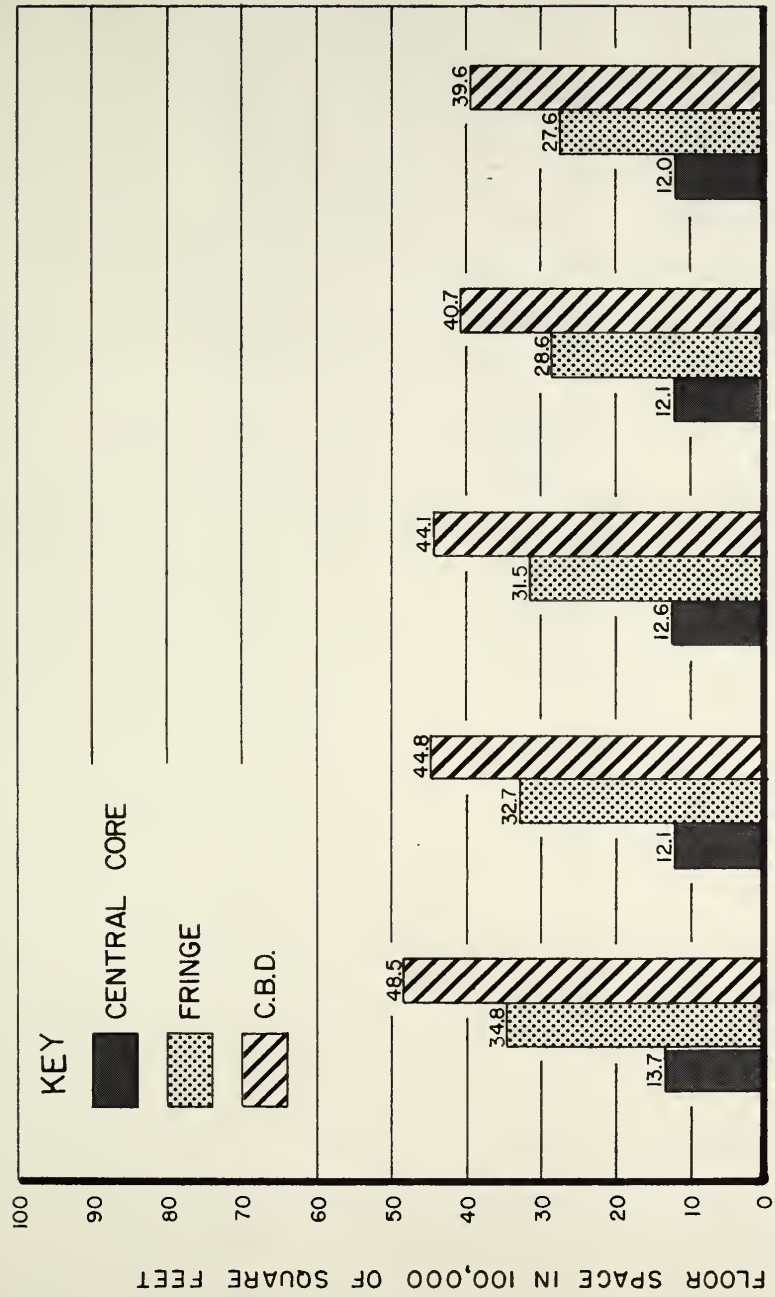


FIGURE 14—COMPARISONS OF TOTAL FLOOR SPACE ON ALL FLOORS FOR CORE, FRINGE, AND C.B.D.

Changes by Space-Use Categories. The space-use classification and coding system used in this study (Appendix I) permits analysis on three different levels of detail: the one-, two-, and three-digit levels. Space-use analyses carried on each of these levels of detail are complementary; they reveal different aspects of functional change. Accordingly, the following space-use analyses are carried on each of the three levels consecutively.

One-Digit Space Uses. Two related aspects of change are examined: (1) The change in the proportions of the total CBD floor space devoted to different space-use categories, and (2) the relative change (increase or decrease) in the floor space devoted to these categories over the period 1950-1957. Figure 15 shows the changes in the proportions of total floor space devoted to one-digit space-use categories in the core, fringe, and CBD on street floor, other floors, and all floors for each of the reference years. Figure 16 shows the changes in floor space used by one-digit space-use categories over the period 1950-1967. In this figure, the categories which did not occupy any floor space during the study period are not included. By examining Figures 15 and 16 together, a number of observations can be made:

1. Trade (noted as [5]) and services [6] are the major CBD space users. Residential [1] and unused land and vacant floor areas [9] are the next largest space users (Figure 15).

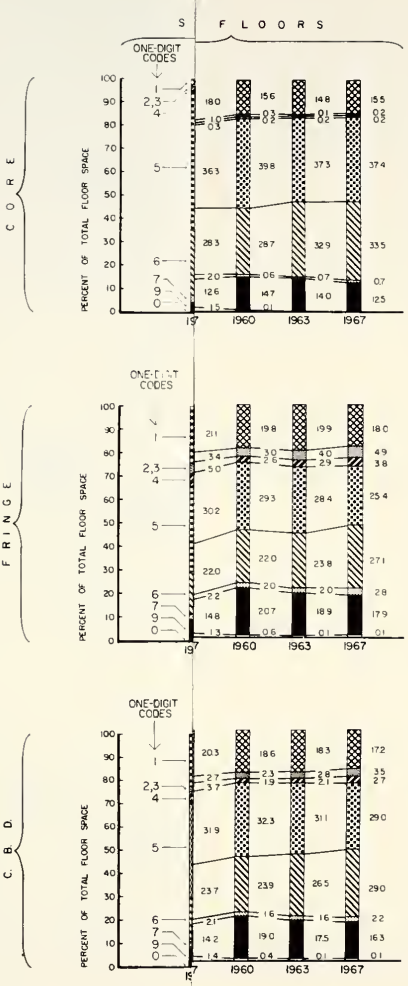


FIGURE 15 —OOR SPACE

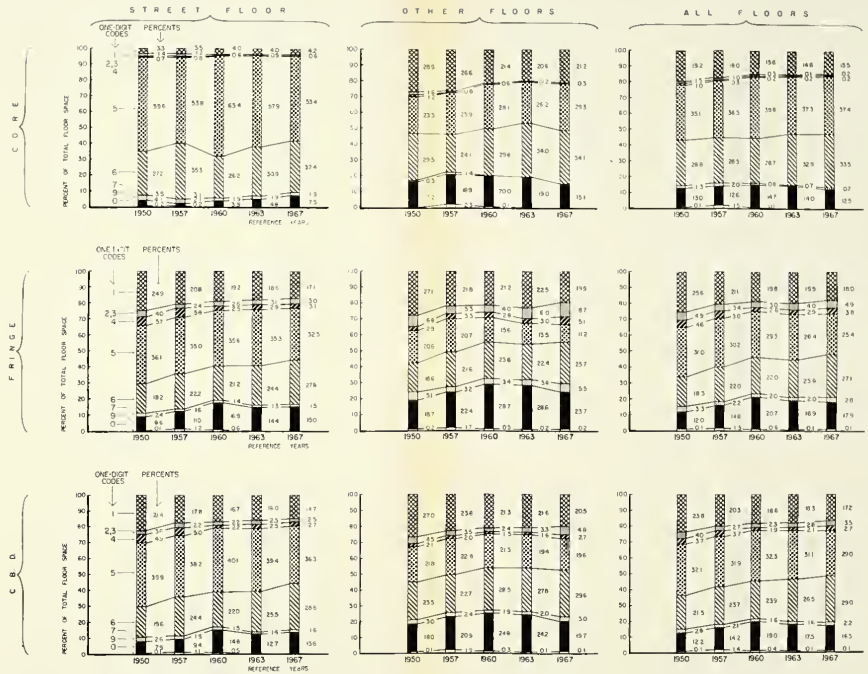


FIGURE 15 – COMPARISONS OF THE PROPORTIONS OF TOTAL FLOOR SPACE DEVOTED TO ONE-DIGIT SPACE-USE CATEGORIES FOR CORE, FRINGE, AND C.B.D.

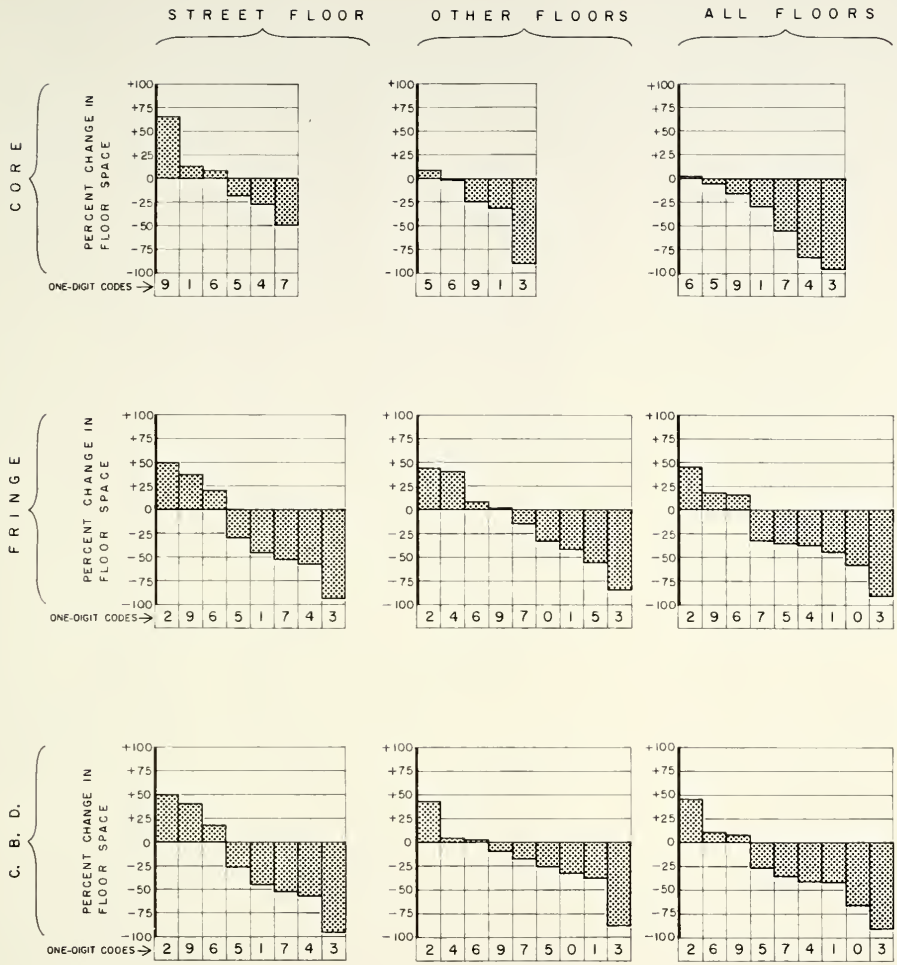


FIGURE 16 - CHANGES IN FLOOR SPACE USE, 1950-1967 (ONE-DIGIT CATEGORIES)

2. In the core, trade and services remained almost unchanged. All other categories lost in floor space. Services gained floor space on the street floor while trade gained on other floors. Vacancies [9] in all floors decreased 15.4 percent.
3. In the fringe, services gained 17 percent, trade lost 35 percent, and vacancies gained 18 percent. Most of the increased vacancies were on the street floor.
4. In the entire CBD, services gained 11 percent, vacancies gained 8 percent, while trade lost 26 percent. All other categories lost except manufacturing [2].

For most of the one-digit space-use categories, a noticeable trend toward fewer and large establishments has been observed. In the fringe, this trend was more pronounced.

Two-Digit Space Uses. The changes in floor space used by two-digit space-use categories over the period 1950-1967 are shown in Figure 17. Categories which appeared and/or disappeared during the study period are not shown as these are examined only on the three-digit level.

Of the service functions in the core, the more specialized ones such as finance, insurance, and real estate services [61], business services [63], and professional services [65] gained in floor space (all floors). The less specialized services such as repair services [64] and contract

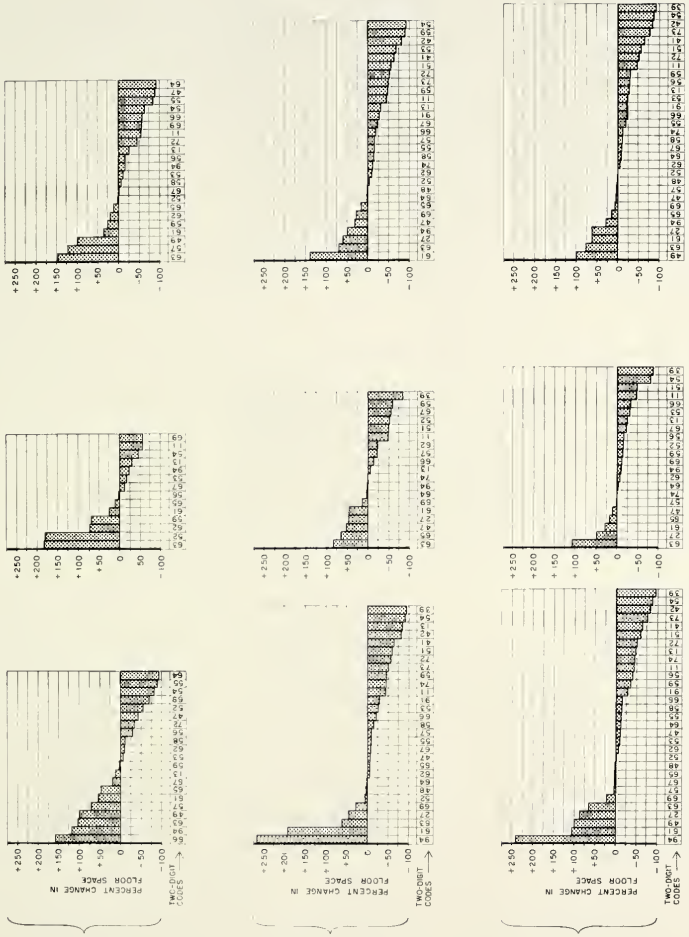


FIGURE 17 - CHANGES IN FLOOR SPACE USE, 1950-1967
(TWO-DIGIT CATEGORIES)

construction services [66] lost. Governmental services [67] remained almost constant. The degree of specialization, the importance of comparative shoppping, and the relative compactness of core retail functions tended to influence the changes in their relative importance as measured by total floor space. Thus, furniture, home furnishings, and equipment retail [57], for example, gained 123 percent, while food retail [54] lost 64 percent and automotive and accessories retail [55] lost 84 percent (Figure 17). In the fringe, all retail functions lost in total floor space.

In the CBD at large, the service function which lost most was contract construction [66]. All other service functions either remained almost constant or gained. Of the eight two-digit retail categories, furniture, home furnishings, and equipment [57] was the only one which did not lose in total floor space. Cultural, entertainment and recreational functions [72, 73, and 74] also lost. The adverse effect of the growth of outlying shopping centers on the CBD is well recognized. To examine the extent of this effect, a comparison was made over the reference years between space uses typically found in the shopping centers and the same uses in the CBD. The two-digit codes for these space-uses are: [52, 53, 54, 56, 57, 58, 59, and 62]. Figure 18 shows a comparison of the total floor space used by this group of functions in the principal outlying shopping centers and in the CBD. In 1950 almost all outlets of this group of functions in the

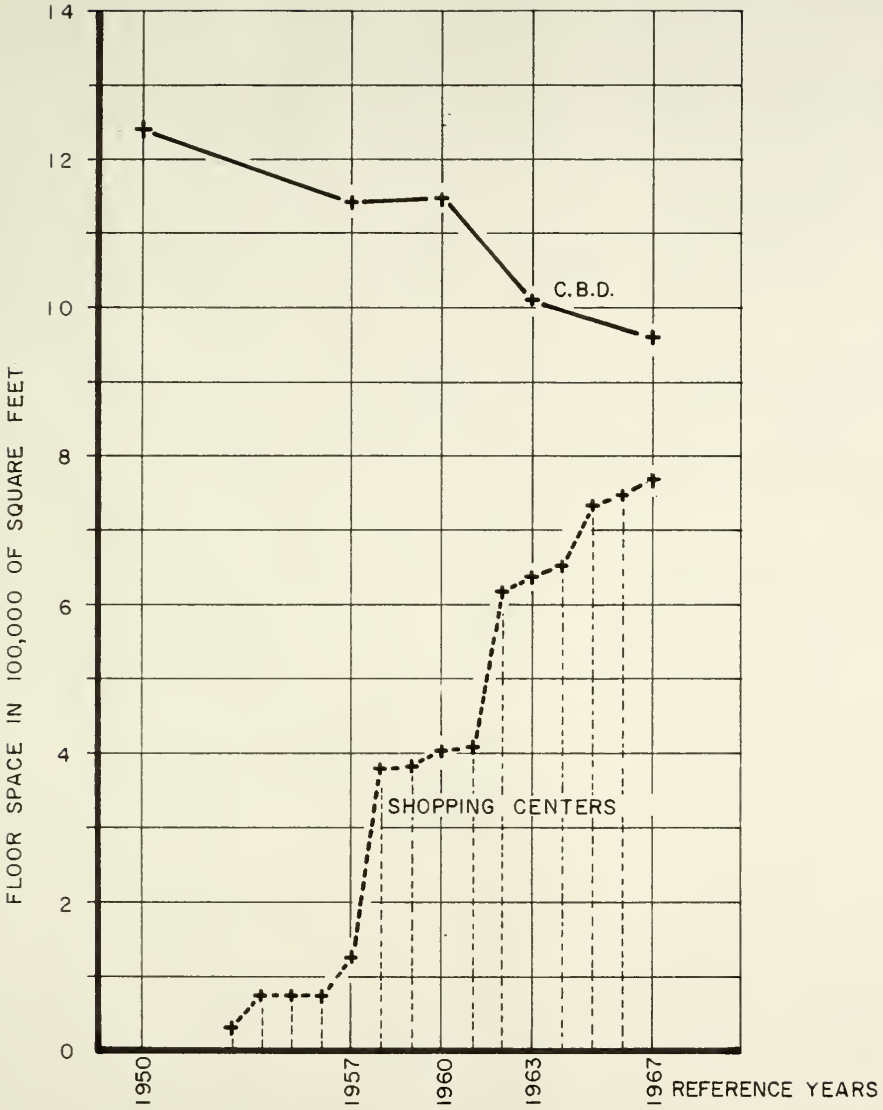


FIGURE 18 – A COMPARISON BETWEEN SPACE USES FOUND IN THE SHOPPING CENTERS AND THE SAME USES IN THE C.B.D.

urban area were concentrated in the CBD. In 1967, only about 56 percent of their total floor space (in the urban area) was held by the CBD. It is significant that, despite the tremendous growth of these functions in the shopping centers and the subsequent decline in their representation in the CBD, the latter still held, in 1967, more floor space devoted to these functions than all the principal shopping centers combined.

Three-Digit Space Uses. Two major aspects of space-use change are considered in the following analysis: (1) changes in space-use by categories, and (2) relative shifts in space uses from the core to the fringe and visa versa. Space-use categories in the core and in the fringe were, therefore, analyzed separately. For each, four attributes were examined:

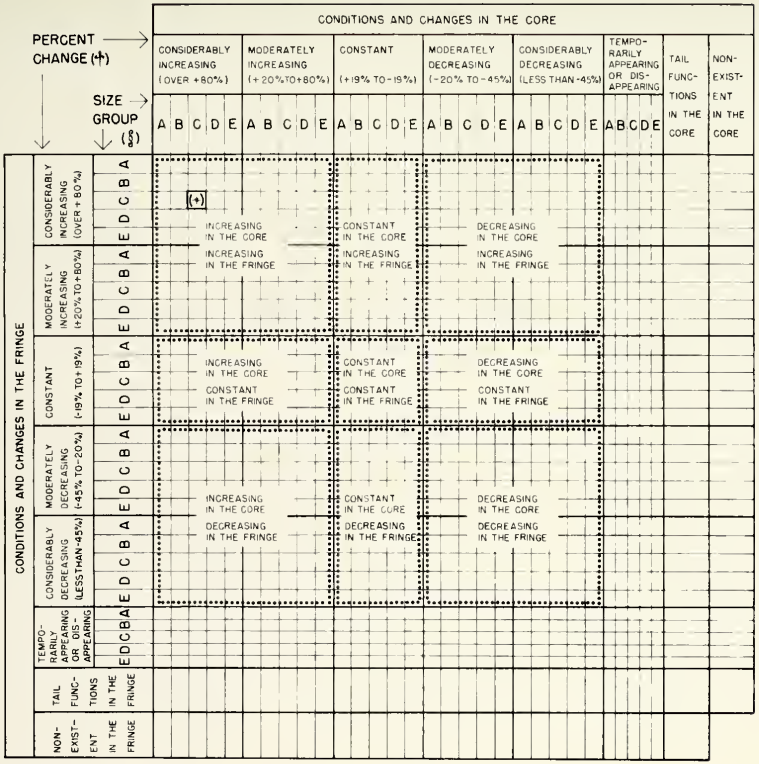
1. Percent change in floor space (all floors) during the period 1950-1967. This is the relative increase or decrease in the total floor space used by a given category during the period 1950-1967.
2. Rate of change in floor space. The total floor space used by each category was plotted over the five reference years. Rates of change were classified under four main classes: increasing, constant, decreasing, and fluctuating.
3. Size group. Space-use categories were ordered by the total floor space they occupied in 1950; the largest to the smallest. These were grouped into

a hierarchy of five size groups.

4. Permanence. Space-use categories which appeared and/or disappeared during the study period were analyzed separately from those which existed throughout the period.

Two matrices were developed to represent the results of these analyses. The first, the functional change matrix, displays the changes that took place in the space-use categories which existed throughout the study period in at least one of the two CBD zones (the core and the fringe). The second represents appearing and disappearing categories. Space uses which existed throughout the period in only one of the CBD zones but appeared and/or disappeared in the other are shown in both matrices.

Figure 19 shows a schematic layout of the functional change matrix and gives definitions to the terms used in it. For each space-use category (on the three-digit level), the matrix shows the size group (group A through E) to which the category belonged in 1950 in both the core (columns) and the fringe (rows). It also gives the type, magnitude, and rate of change in the total floor space used by the category in the core and in the fringe. Space-use categories which belonged throughout the period to the group of smallest space users are shown under "tail functions." Those which started as "tail functions" in 1950 but gained enough floor space in subsequent years and moved to a higher order size group are


PERCENT CHANGE (+)
SIZE GROUP (§)
CONDITIONS AND CHANGES IN THE CORE
CONSIDERABLY INCREASING (OVER +80%)
MODERATELY INCREASING (+20% TO +80%)
CONSTANT (+19% TO -19%)
MODERATELY DECREASING (-20% TO -45%)
CONSIDERABLY DECREASING (LESS THAN -45%)
TEMPORARILY APPEARING OR DISAPPEARING
TAIL FUNCTIONS IN THE CORE
NON-EXISTENT IN THE CORE
A B C D E
CONDITIONS AND CHANGES IN THE FRINGE
INCREASING IN THE CORE
INCREASING IN THE FRINGE
CONSTANT IN THE CORE
CONSTANT IN THE FRINGE
DECREASING IN THE CORE
DECREASING IN THE FRINGE
TAIL FUNCTIONS IN THE FRINGE
NON-EXISTENT IN THE FRINGE

(+) PERCENT CHANGE, 1950-1967

PERCENT CHANGE IN FLOOR SPACE FOR CATEGORY i =

$$\frac{\text{TOTAL 1967 FLOOR SPACE (ALL FLOORS)}_i - \text{TOTAL 1950 FLOOR SPACE (ALL FLOORS)}_i}{\text{TOTAL 1950 FLOOR SPACE (ALL FLOORS)}_i} \times 100$$

(§) SIZE GROUP (ORDERED BY SPACE-USE; LARGEST TO SMALLEST)

GROUP A LARGEST SPACE USERS IN 1950, OCCUPYING 45% OF THE GRAND TOTAL FLOOR SPACE (ALL FLOORS)

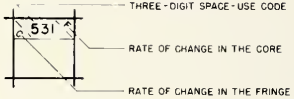
GROUP B NEXT LARGER SPACE USERS IN 1950, OCCUPYING THE NEXT 25% OF THE GRAND TOTAL FLOOR SPACE (ALL FLOORS).

GROUP C NEXT LARGER SPACE USERS IN 1950, OCCUPYING THE NEXT 15% OF THE GRAND TOTAL FLOOR SPACE (ALL FLOORS)

GROUP D NEXT LARGER SPACE USERS IN 1950, OCCUPYING THE NEXT 10% OF THE GRAND TOTAL FLOOR SPACE (ALL FLOORS)

GROUP E = SMALLEST SPACE USERS IN 1950 (TAIL FUNCTIONS), OCCUPYING THE LAST 5% OF THE GRAND TOTAL FLOOR SPACE (ALL FLOORS).

(+)



RATE OF CHANGE

I = INCREASING RATE OF CHANGE
C = CONSTANT RATE OF CHANGE
D = DECREASING RATE OF CHANGE
F = FLUCTUATING RATE OF CHANGE

FIGURE 19 - THE FUNCTIONAL CHANGE MATRIX - LAYOUT AND DEFINITIONS

represented under size group "E." Categories which remained "tail functions" throughout the period both in the core and the fringe are not considered in the analysis. Figure 20 shows the functional change matrix. Of the categories which increased both in the core and the fringe, credit services [612] is the only one which increased considerably in both zones. In the core, its total floor space increased by 174 percent (at a noticeably increasing rate). In the fringe, it increased by 346 percent. Banking services [611] gained considerably in the fringe (243 percent) but not as much in the core (75 percent). This is probably due to the difficulty of providing sufficient customer parking facilities in the core. Second-hand merchandise retail [593] was not present in the core but has gained 281 percent in the fringe. This is an example of retail functions which expanded in the CBD because of the absence of their counterparts in the shopping centers. The same applies for educational services [680] and welfare and charitable services [692]. Miscellaneous retail functions [599] such as cigar stores, newspaper stands, camera shops, toy and hobby centers, and gift shops remained almost constant in both the core and the fringe. These represent a type of specialized retail functions which is apt to retain its relative importance in the CBD. Household appliances [572] moved steadily into the core. It lost 71 percent of its floor space in the fringe and gains 198 percent in the core. In 1950, it represented only 0.16 percent of the total floor space in the core; in 1967, it represented 0.53 percent.

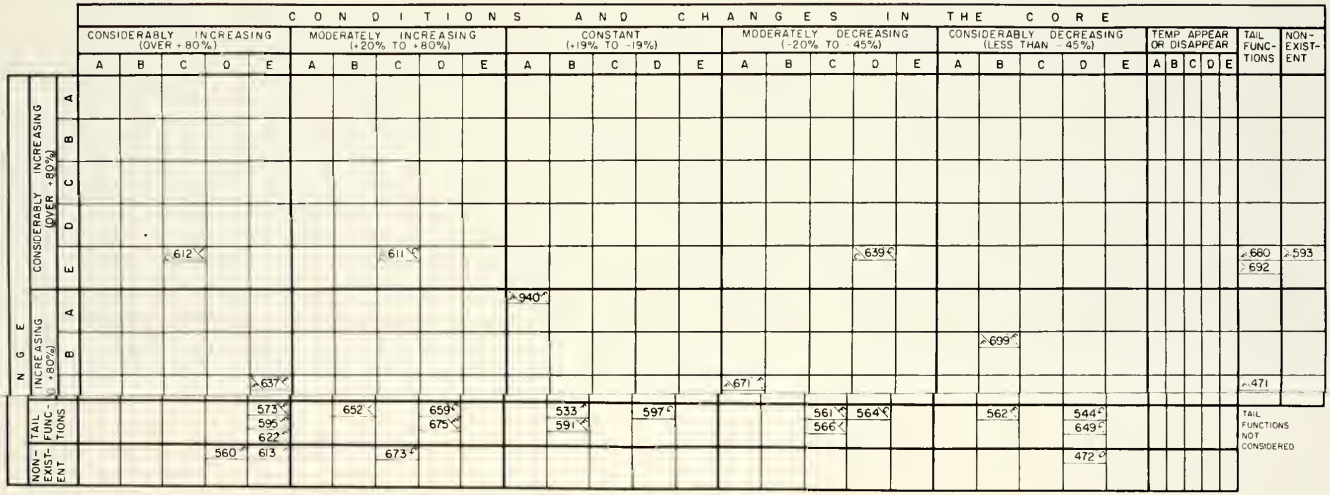


FIGURE 20 – THE FUNCTIONAL CHANGE MATRIX

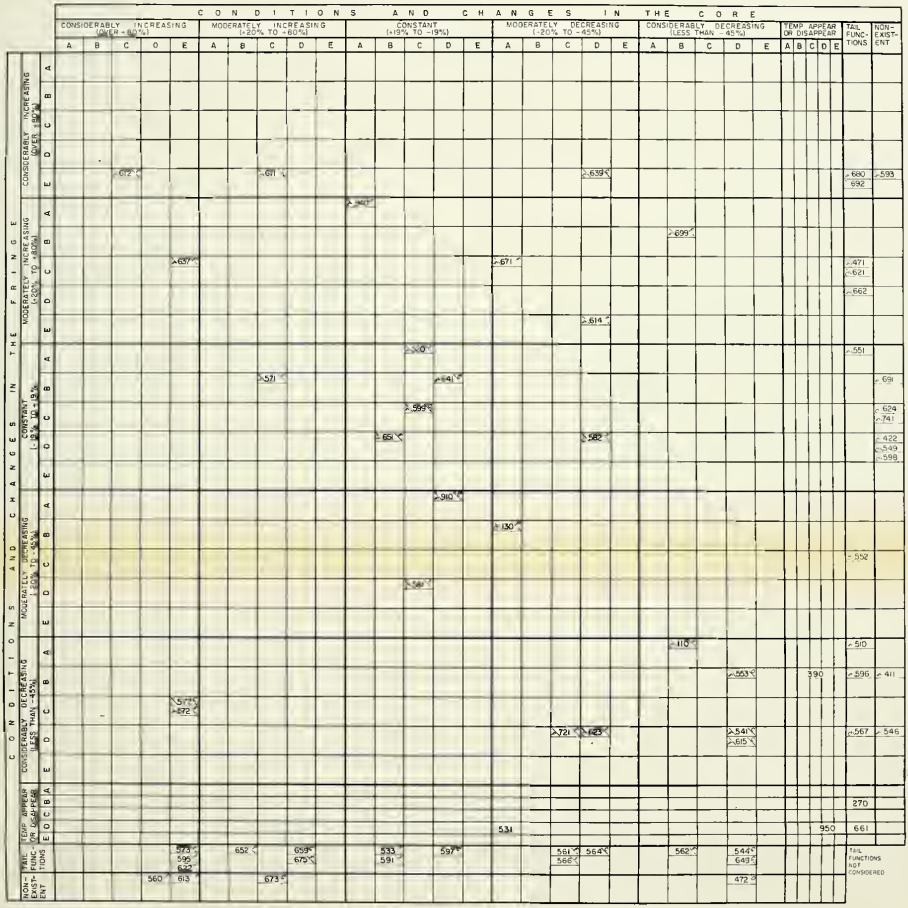

CONDITIONS AND CHANGES IN THE CORE
CONSIDERABLY INCREASING (LOWER - 80%)
MODERATELY INCREASING (+25% TO +80%)
CONSTANT (+19% TO -19%)
MODERATELY DECREASING (-20% TO -45%)
CONSIDERABLY DECREASING (LESS THAN -45%)
TEMP APPEAR OR DISAPPEAR
TAIL FUNCTIONS
NON-EXISTENT
CONDITIONS AND CHANGES IN THE FIRE
CONSIDERABLY INCREASING (OVER 150%)
MODERATELY INCREASING (+25% TO +80%)
LITTLE OR NO CHANGE (-19% TO +19%)
MODERATELY DECREASING (-20% TO -45%)
CONSIDERABLY DECREASING (LESS THAN -45%)
TEMP APPEAR OR DISAPPEAR
NON-EXISTENT
TAIL FUNCTIONS NOT CONSIDERED

FIGURE 20 - THE FUNCTIONAL CHANGE MATRIX

Because of their relative compactness and their reliance on comparative shopping, household appliances establishments tended to cluster together in the core.

Groceries [541] and gasoline service stations [553] were among the categories which lost considerably in both the core and the fringe. Such consumer oriented functions tended to move out of the CBD and relocate in proximity to residential areas. With the exception of general clothing retail [560], apparel and accessories retail functions tended to lose in the core. Shopping centers attracted a substantial number of these.

Space-use categories which appeared and/or disappeared during the study period are shown in Figure 21. The majority of these categories have disappeared either from the core or from the fringe. The ones which disappeared from the core are predominantly large space users (wholesale trade, motor vehicles retail, billiard rooms, and auto repair services). Those which disappeared from the fringe are mostly specialized core retail functions (sporting goods, women's accessories, tailors, and jewelers). Fewer categories appeared in either the core or the fringe and none appeared in both. No categories disappeared from the core and appeared in the fringe. The internal locational shifts in CBD functions seem to occur inwardly from the fringe to the core.

A number of space-use and locational characteristics were found to correlate with the types and magnitudes of the

CONDITIONS AND CHANGES IN THE FRINGE		CONDITIONS AND CHANGES IN THE CORE										
		APPEARED IN:				DISAPPEARED IN:				TEMPORARILY APPEARING OR DISAPPEARING	EXISTENT THROUGHOUT THE PERIOD	NONEXISTENT THROUGHOUT THE PERIOD
		1957	1960	1963	1967	1957	1960	1963	1967			
APPEARED IN:	1957											
	1960									532	611	
	1963											
	1967										652	
DISAPPEARED IN:	1957		636				568				544 564 592	210 635
	1960									539	595	422 549 569 598 710
	1963										561 563	250 280
	1967								680	481 594	567 597 622	546 634
TEMPORARILY APPEARING OR DISAPPEARING		270				631 661						
EXISTENT THROUGHOUT THE PERIOD		637			692 910	471 510	541 551 730 641	000	553			
NONEXISTENT THROUGHOUT THE PERIOD		613					633					

FIGURE 21 - APPEARING AND DISAPPEARING SPACE USES, 1950-1967

space-use changes outlined above. In the core and for the groups of space-use categories which have considerably changed (increased or decreased), the changes occurred mainly in floor space on other floors. Thus 70 percent of the gains in the increasing group and 62 percent of the losses in the decreasing group occurred on other floors. In the fringe, the reverse of this behavior was observed. For the increasing group, 64 percent of the gain in floor space took place on the street floor and for the decreasing group, 71 percent of the loss was on the street floor.

These contrasting behaviors can be attributed to the differences in the relative value and availability of street floor space in the core and in the fringe. In the core, street floor space has been almost fully used throughout the study period. Expansion was more likely to take place on other floors and street floor space was the last to be reduced. In the fringe, as there was relatively less demand on floor space on other floors, and as street floor space was more available (and desirable), changes tended to take place on the street floor. In the core and fringe, the functions which remained almost constant have gained floor space on other floors equal to or slightly more than what they lost on the street floor.

Floor space gains or losses can be caused by partial increases or decreases in numbers of establishments, in sizes of establishments, or in both combined. In the CBD, floor space gains were mainly caused by increases in sizes of

establishments. Floor space losses were almost equally caused by decreases in numbers and sizes of establishments.

Changes in Vacant Floor Areas are examined in terms of two measures: (1) absolute areas, and (2) proportions of total floor space. Figures 22 through 24 give comparisons of total vacant floor areas on street floors, other floors, and all floors respectively for the core, fringe, and CBD for each of the reference years. Street floor vacancies in the CBD increased by 242 percent during the period 1950 - 1967. Most of this increase took place in the fringe. Street floor vacancies in the fringe reached a peak in 1960 and started decreasing in subsequent years. In the core, these vacancies have been constantly increasing throughout the period 1950-1967 (Figure 22). On other floors, vacancies decreased by 24 percent in the core and remained almost constant in the fringe. In 1960, both the core and the fringe had their highest other floors vacancies (Figure 23). Vacancies on all floors decreased by 16 percent in the core and increased by 51 percent in the fringe with an average of 25 percent increase for the entire CBD (Figure 24).

Figures 25 through 27 show the proportions of vacant floor areas on street floor, other floors, and all floors respectively in the core, fringe, and CBD for each of the reference years. In 1950, the percents of street floor vacancies were almost equal in the core and in the fringe. In 1960, the core had 3.8 percent vacancies while this proportion

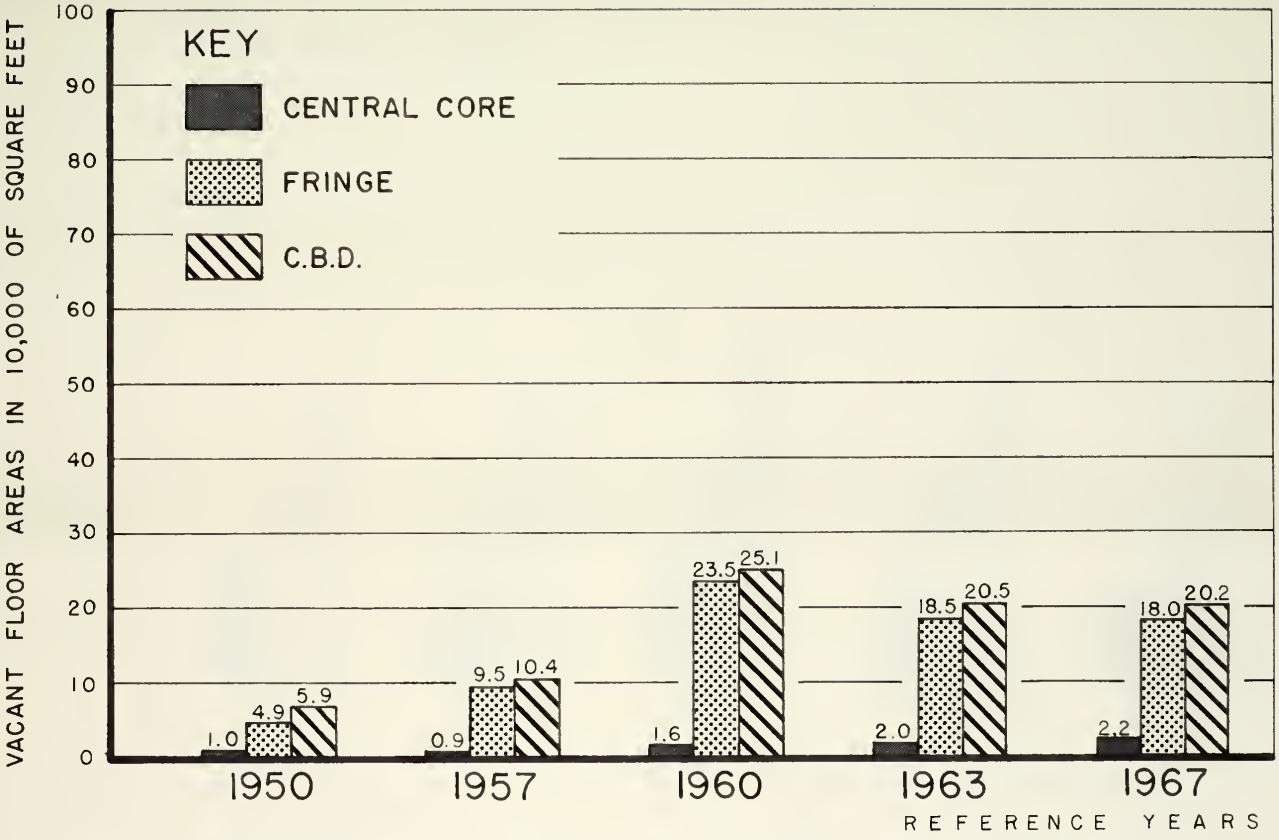


FIGURE 22 - COMPARISONS OF VACANT FLOOR AREAS ON STREET FLOOR FOR CORE, FRINGE, AND C. B. D.

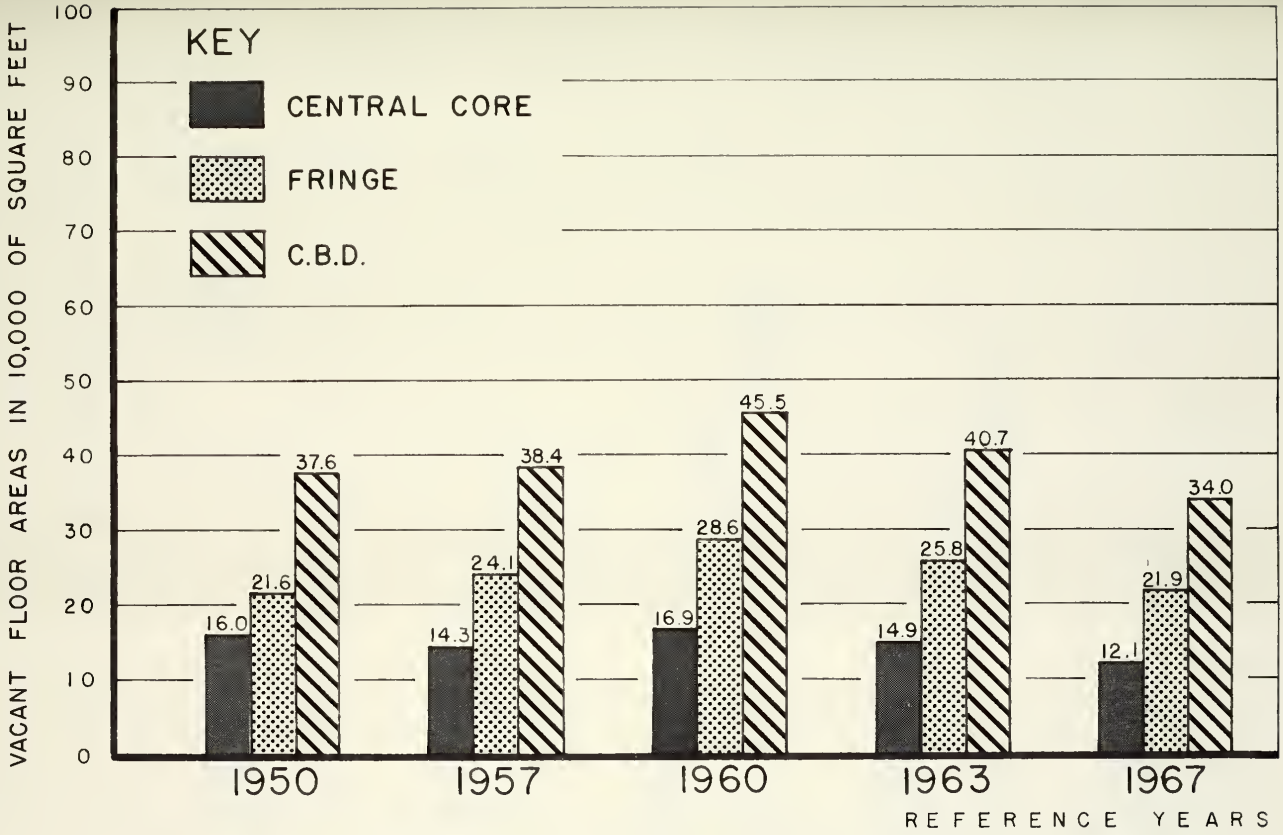


FIGURE 23 - COMPARISONS OF VACANT FLOOR AREAS ON OTHER FLOORS FOR CORE, FRINGE, AND C. B. D.

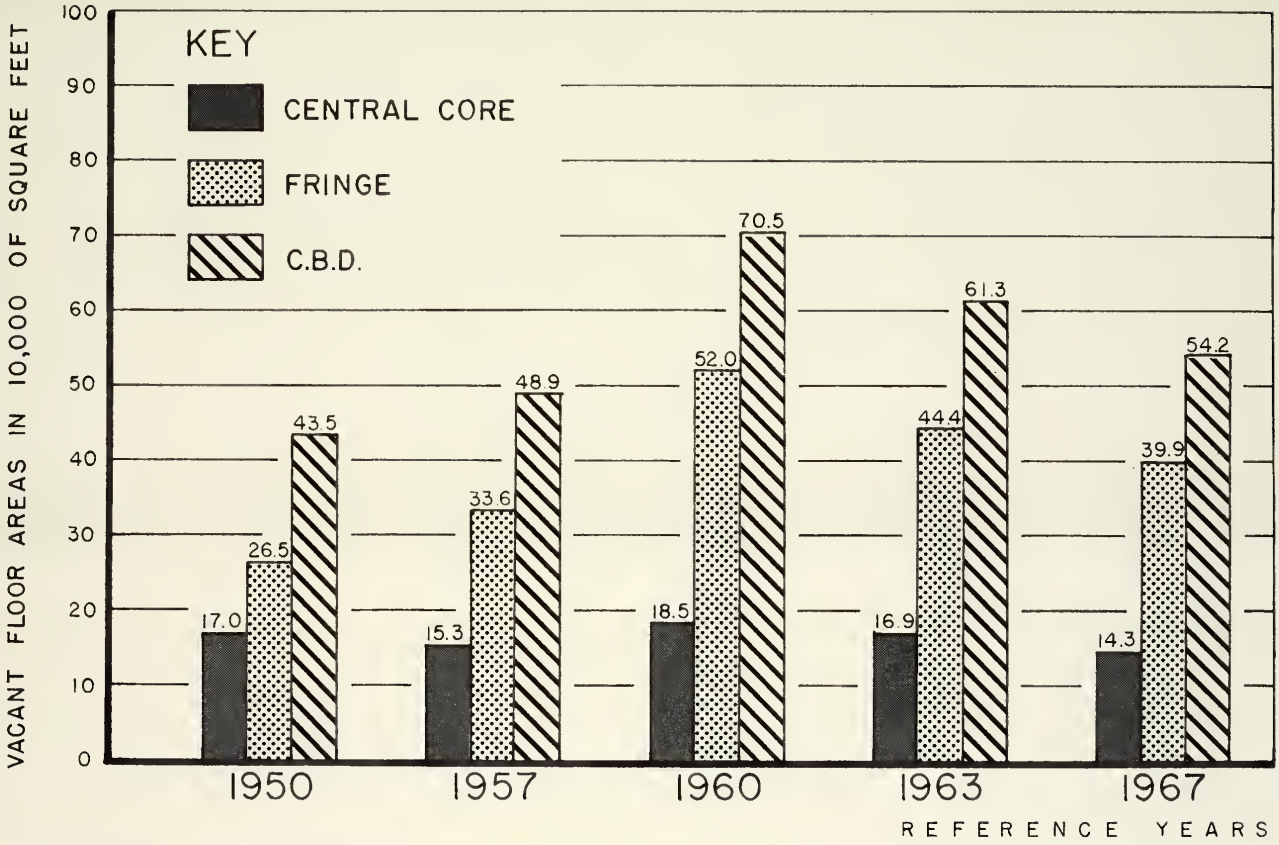


FIGURE 24—COMPARISONS OF VACANT FLOOR AREAS ON ALL FLOORS FOR CORE, FRINGE, AND C.B.D.

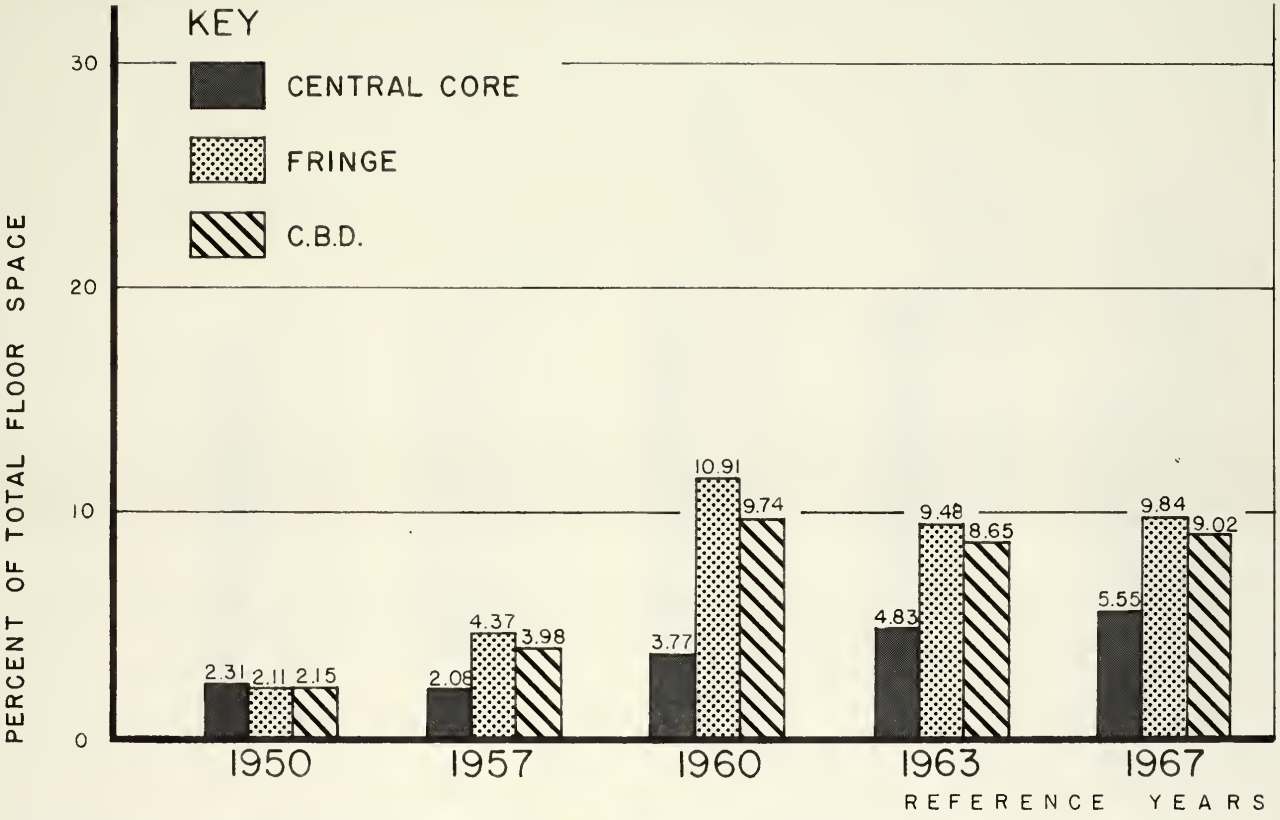


FIGURE 25 – PROPORTIONS OF VACANT FLOOR AREAS ON STREET FLOOR IN THE CORE, FRINGE, AND C. B. D.

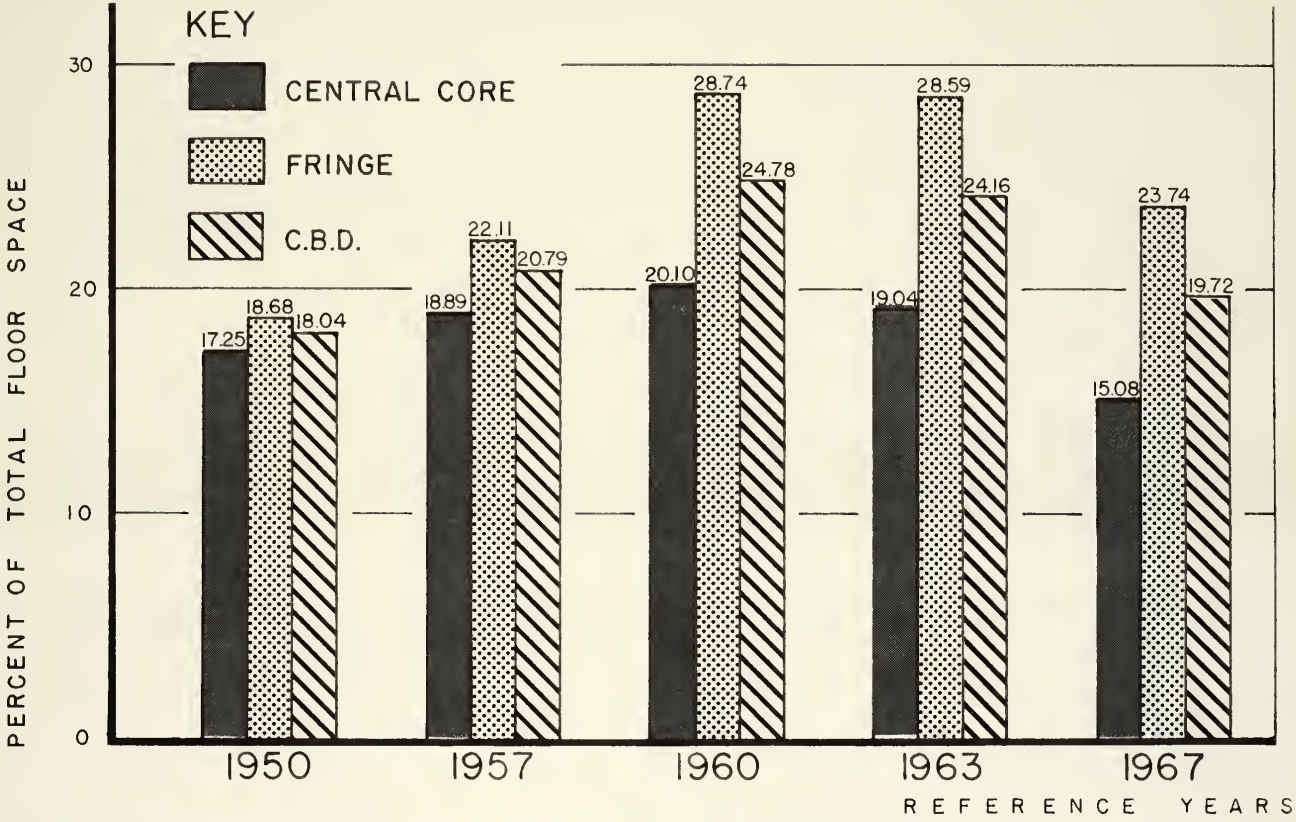


FIGURE 26— PROPORTIONS OF VACANT FLOOR AREAS ON OTHER FLOORS IN THE CORE, FRINGE, AND C. B. D.

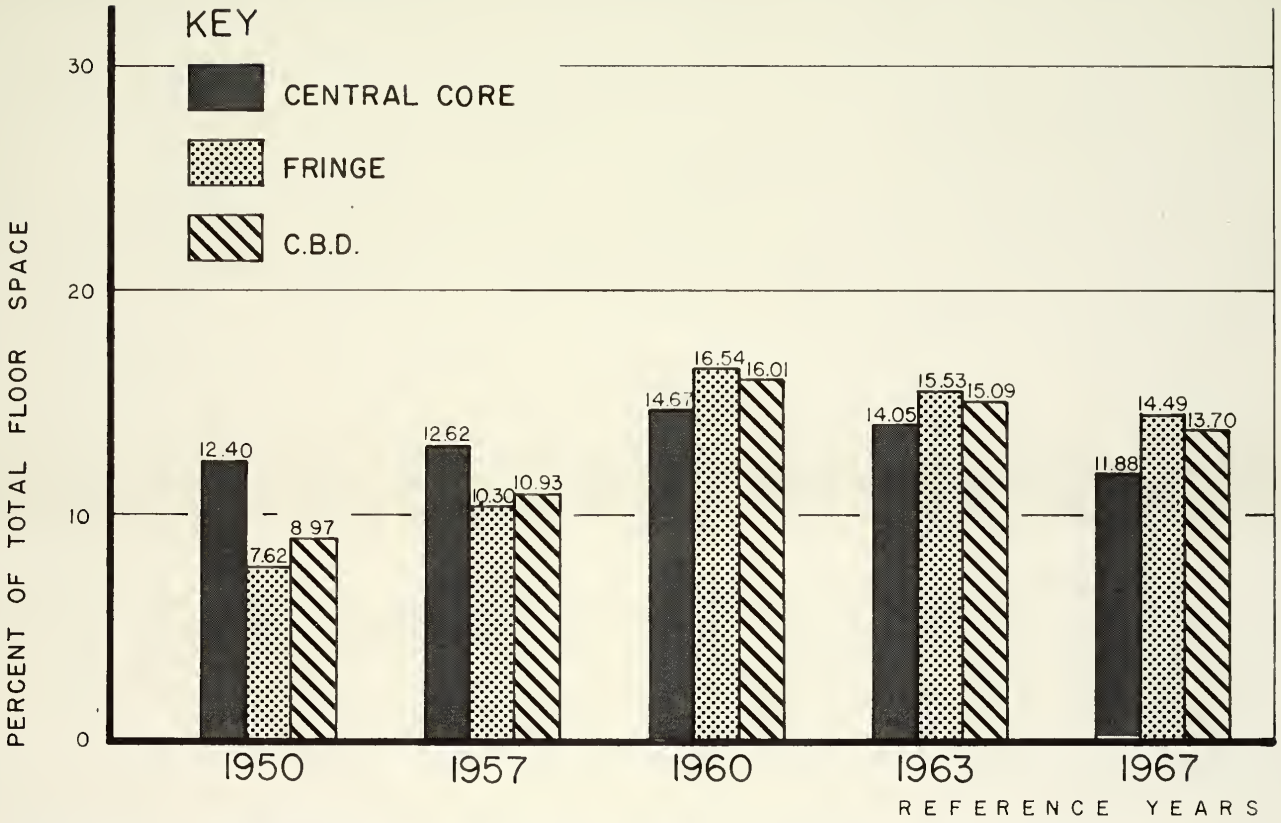


FIGURE 27 – PROPORTIONS OF VACANT FLOOR AREAS ON ALL FLOORS IN THE CORE, FRINGE, AND C. B. D.

reached 10.9 in the fringe. Between 1960 and 1967, the proportions of street floor vacancies increased in the core and decreased in the fringe (Figure 25). Throughout the study period, the percents of vacancies on other floors were higher in the fringe than in the core (Figure 26). While in 1950 the core had a substantially higher percent of vacancies on all floors than the fringe, the situation changed since 1960. In subsequent years, the proportion of vacancies in the core decreased more rapidly than in the fringe (Figure 27).

The highest CBD vacancies occurred in 1960. This might have been caused by the large growth of shopping centers during the preceding years. Between 1953 and 1960, floor space in shopping centers increased by 1193 percent (from 32,000 sq. ft. in 1953 to 413,750 sq. ft. in 1960). In general, CBD vacancy patterns and the observed trends in space-use changes and shifts are consistent and mutually conducive.

Changes in Parking Areas. Three types of parking areas are considered: private parking [461], customer parking [462], and public parking [463]. Figures 28 through 30 give comparisons of these three types of parking areas respectively for the core, fringe, and CBD for each of the reference years. Both in the core and in the fringe, private parking areas remained almost constant throughout the study period (Figure 28). Customer parking increased by 411 percent in the entire CBD. Almost all of this increase took place in the fringe (Figure 29). Public parking increased by 716 percent in the

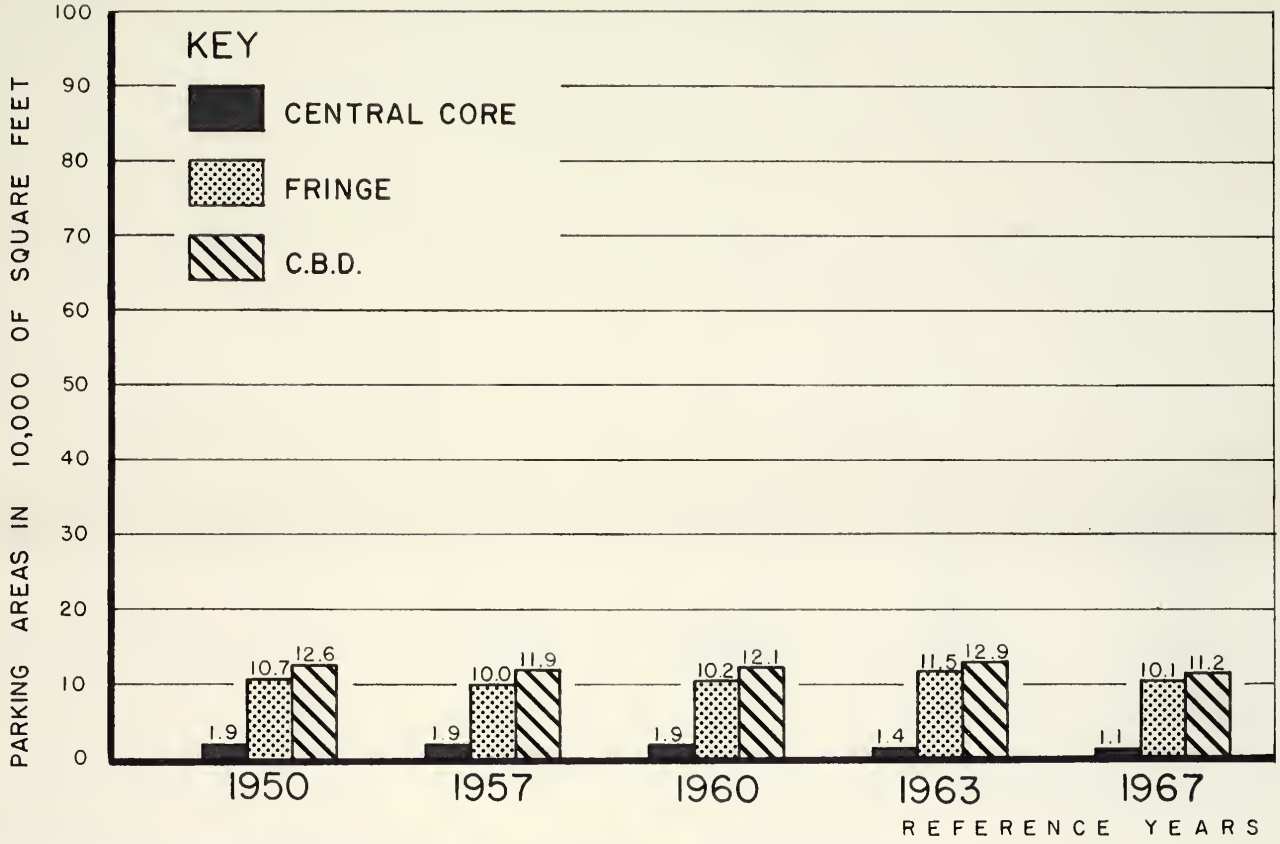


FIGURE 28 – COMPARISONS OF PRIVATE PARKING AREAS FOR CORE, FRINGE, AND C.B.D.

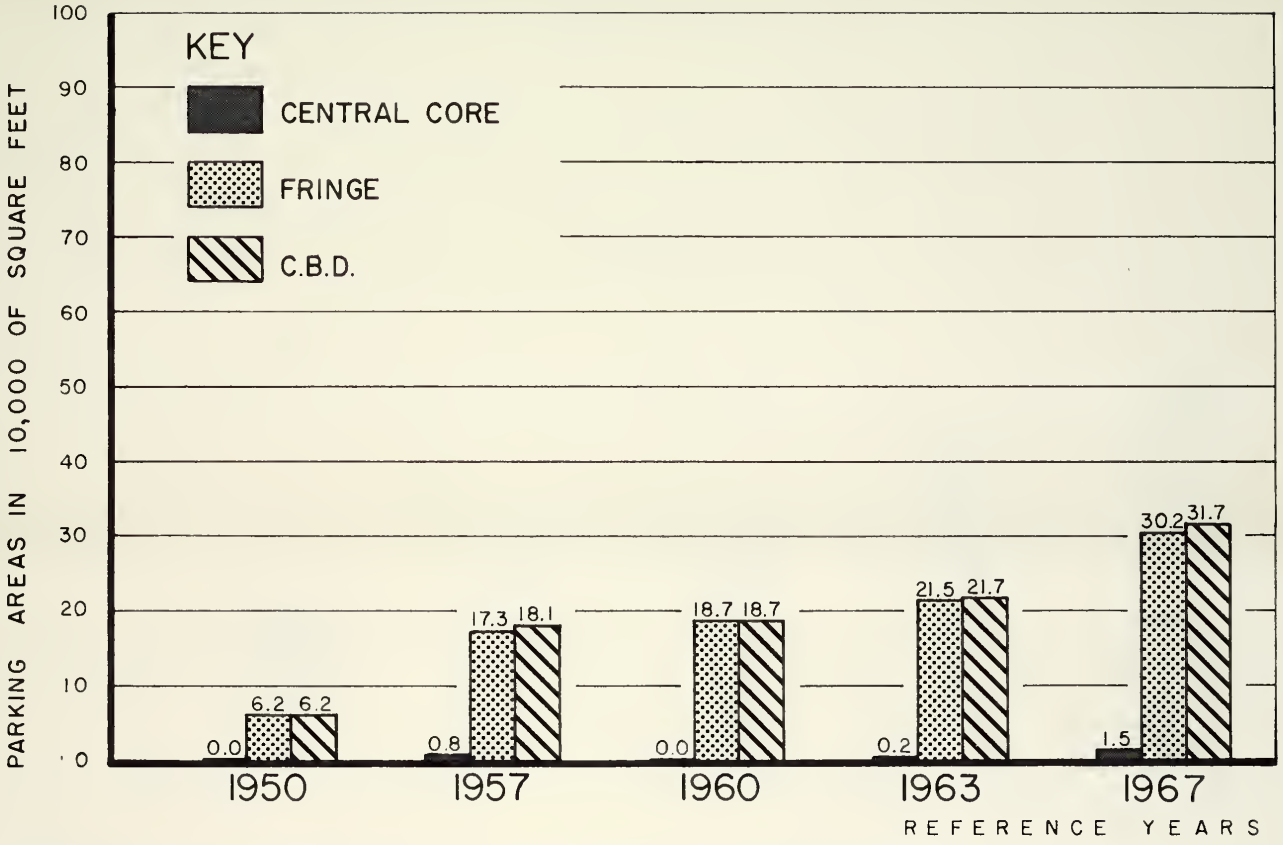


FIGURE 29 – COMPARISONS OF CUSTOMER PARKING AREAS FOR CORE, FRINGE, AND C.B.D.

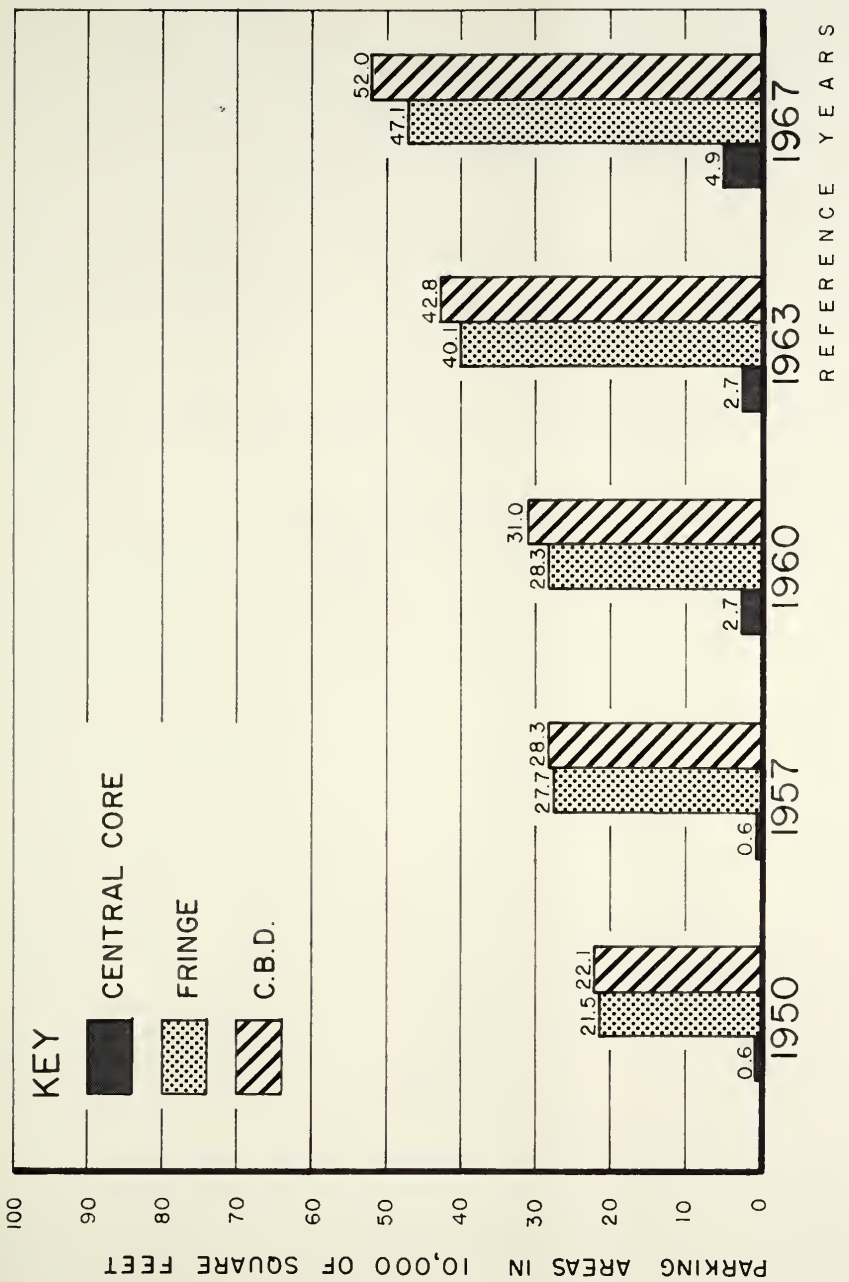


FIGURE 30 - COMPARISONS OF PUBLIC PARKING AREAS FOR CORE, FRINGE, AND C.B.D.

core. However, in terms of absolute area, core public parking represented only 9.4 percent of the total for the CBD in 1967 (Figure 30). Figure 31 gives comparisons of total parking areas of all three types combined.

Table 3 shows the losses in street floor space and the gains in parking areas in the core, fringe, and CBD during the period 1950-1967.

Table 3. Losses in Street Floor Space and Gains in Parking Areas in the Core, Fringe, and CBD, 1950-1967.

	Losses in street floor space, 1950-1967 (square feet)	Gains in parking areas (all types), 1950-1967 (square feet)
Core	40,000	50,000
Fringe	490,000	489,000
CBD	530,000	539,000

It is significant that the CBD has gained even more parking areas than what was lost as street floor space. The core gained an additional 10,000 square feet of parking, which was unused land [910] in 1950. Almost all the street floor space lost in the fringe was turned into parking facilities. These facts illustrate an important facet of the CBD adjustments to the changing urban patterns brought about by the extensive use of the automobile. Of the total CBD land area (excluding streets, alleys, and railroad right-of-ways), 13 percent was

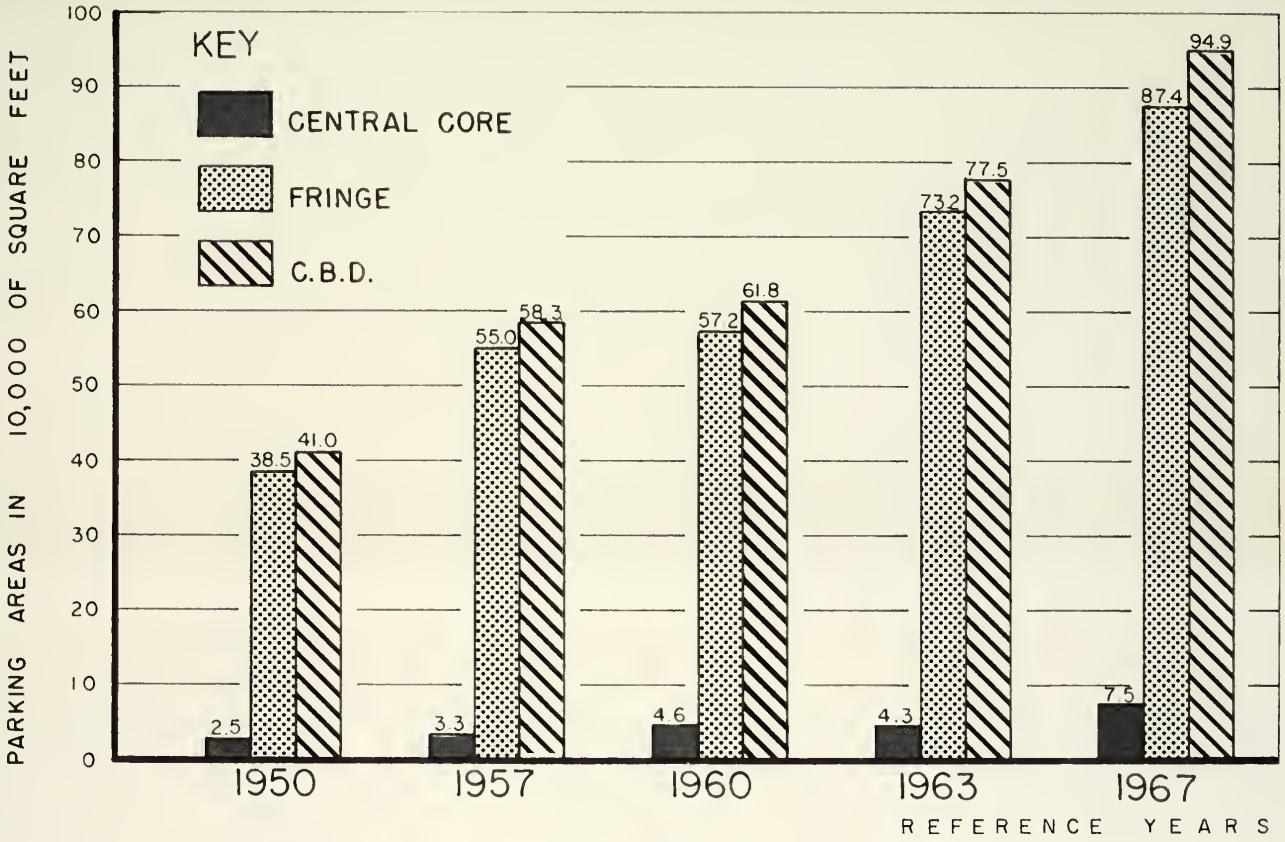


FIGURE 31 – COMPARISONS OF PARKING AREAS (ALL TYPES) FOR CORE, FRINGE, AND C.B.D.

devoted to parking in 1950 and by 1967, this proportion increased to over 30 percent.

Assessed Valuations

Assessed valuations on land and improvements are discussed separately and in combination. For each quarter block included in the CBD, assessed valuations were averaged over the area of taxable land in the quarter block. These averages were converted into value indexes by setting (for each reference year) the highest quarter block average assessed valuations equal to 100 and by relating all other averages to it. This conversion was done for ease of comparison between quarter blocks and over reference years. However, Table 4 gives the highest quarter block assessed valuations on land and on improvements per square foot of taxable land for each of the reference years. Using the values in this table, indexes can easily be converted back into reference year dollar values.

Table 4. CBD Highest Quarter Block Assessed Valuations per Square Foot of Taxable Land.

Reference years	Highest quarter block assessed valuations per square foot of taxable land. (in reference year dollars)	
	Land	Improvements
1950	9.52	13.95
1957	7.30	14.20
1960	6.97	14.20
1963	5.32	15.01
1967	4.82	14.57

Assessed Valuations on Land. Figures 32 through 36 show land value indexes by quarter blocks for 1950, 1957, 1960, 1963, and 1967 respectively. In 1950 and 1957, the point of highest assessed valuations on land was the southeast corner of Main and Fourth. Since 1960, this point shifted to the northwest corner of Main and Fourth. Throughout the study period, the highest land value indexes occurred around the Courthouse and the lowest occurred along the Wabash River. Properties along Main Street carried relatively high assessed valuations throughout the period.

In 1950, high land value indexes tended to concentrate almost entirely around the Courthouse and along Main Street, but in subsequent years, a tendency was noted toward more diffused distribution of high land value indexes. This diffusion was most noticeable along Main (east of Sixth), Columbia, and South Streets and although less pronounced, along Third and Fourth Streets.

The constant increase, over the reference years, in land value indexes of properties located along these urban arterials can be attributed to improved customer mobility attained by more extensive use of the automobile and less reliance on the inflexible mass transportation lines. This new mobility reduced the variance in the relative

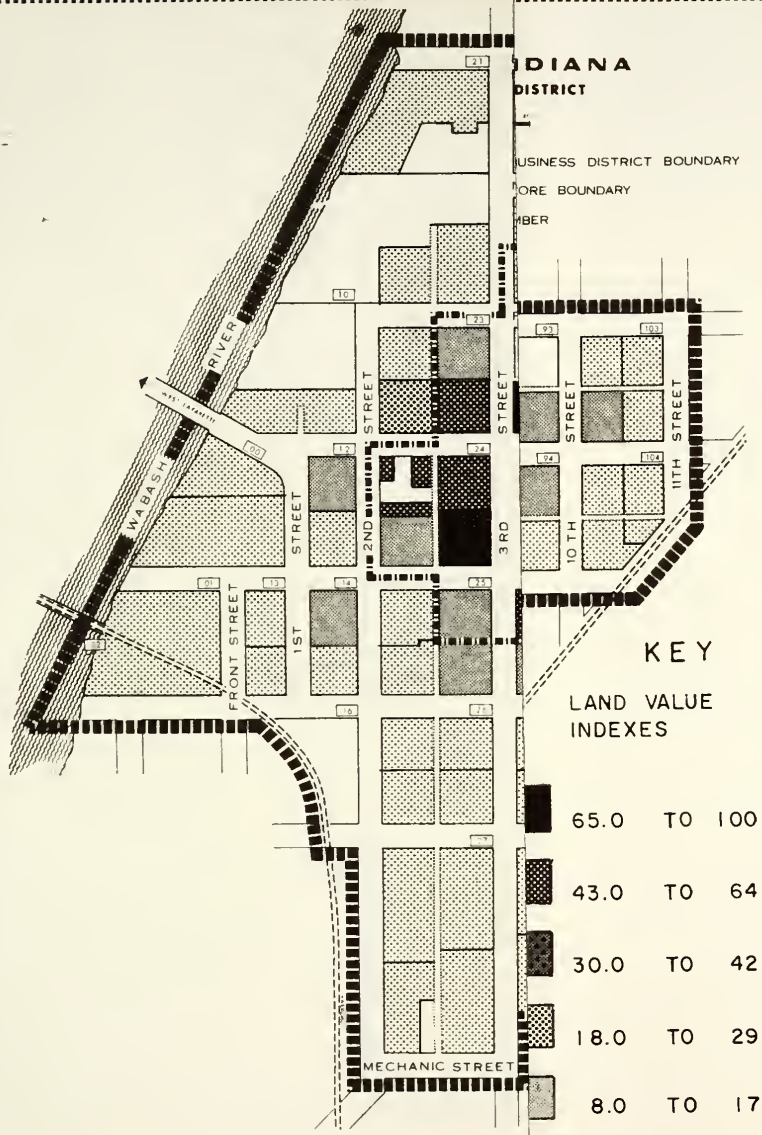


FIGURE 32 — LAND VALUE BY QUARTER

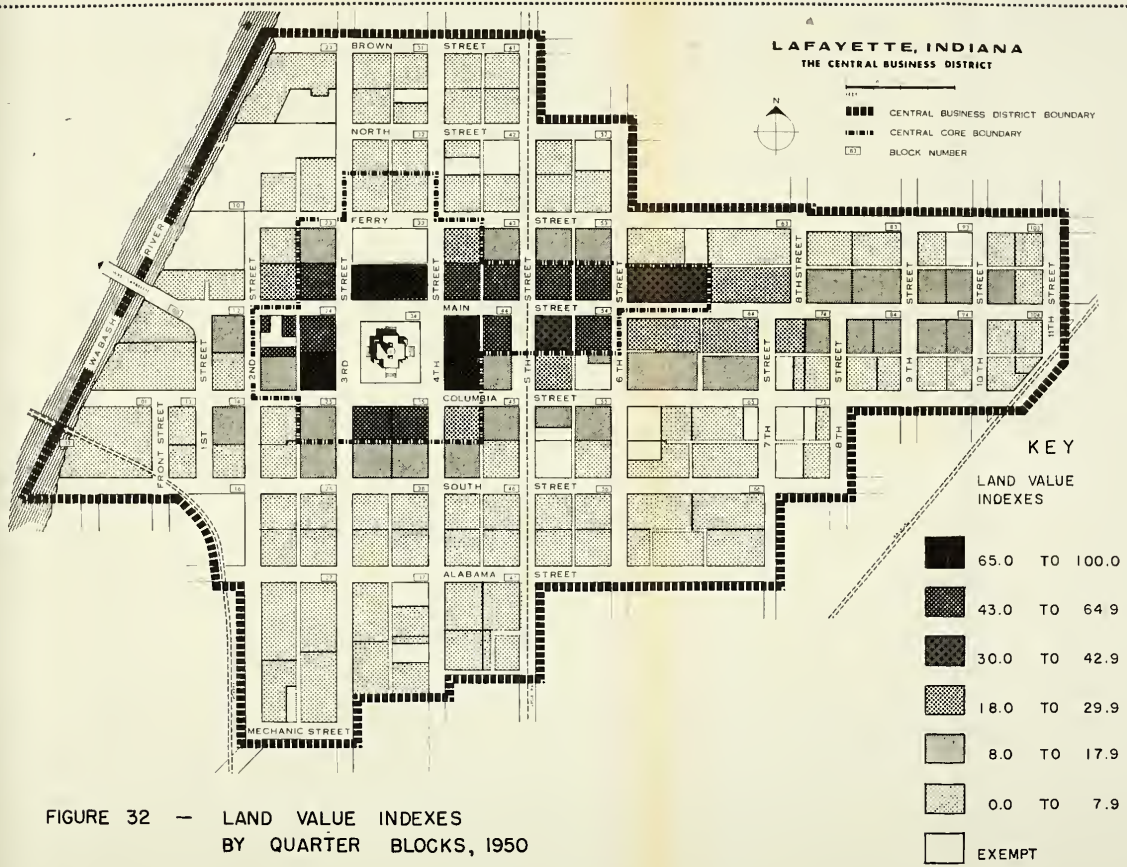


FIGURE 32 — LAND VALUE INDEXES BY QUARTER BLOCKS, 1950

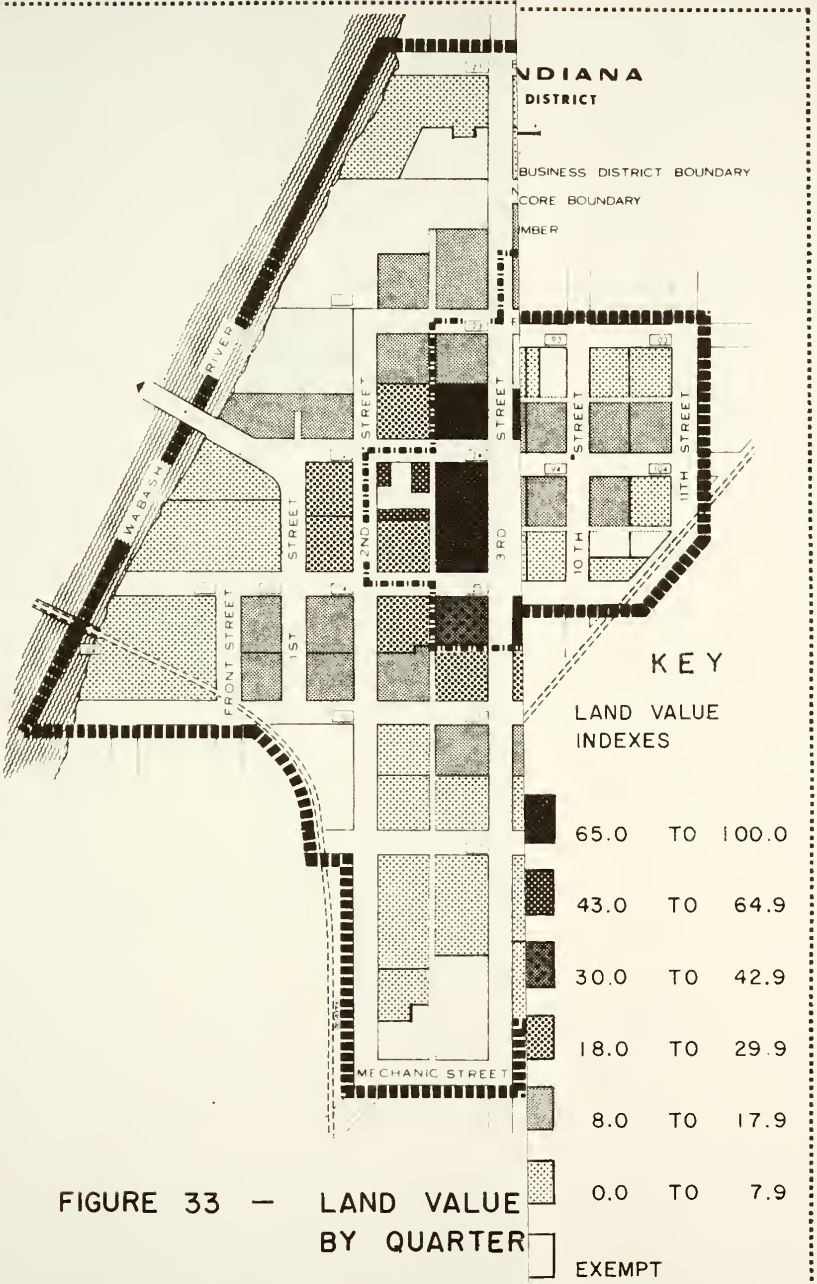


FIGURE 33 — LAND VALUE BY QUARTER

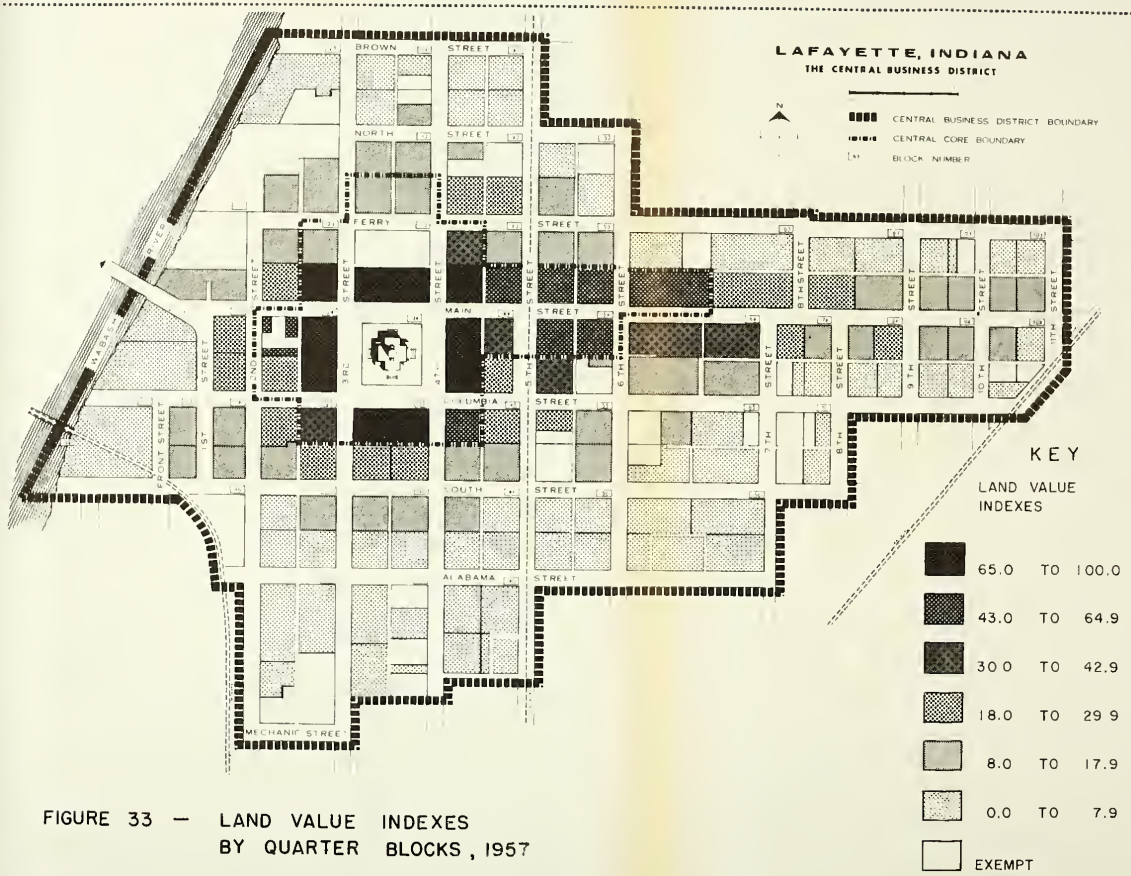


FIGURE 33 — LAND VALUE INDEXES BY QUARTER BLOCKS, 1957

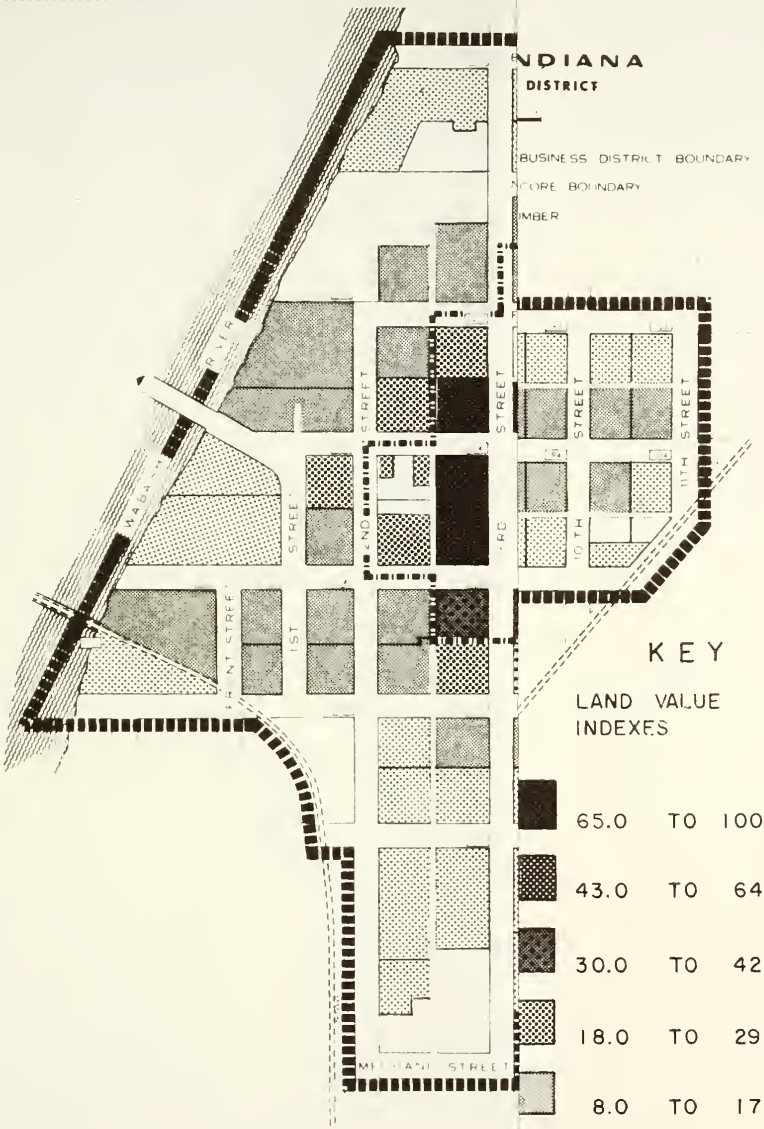


FIGURE 34 — LAND VALUE
BY QUARTER

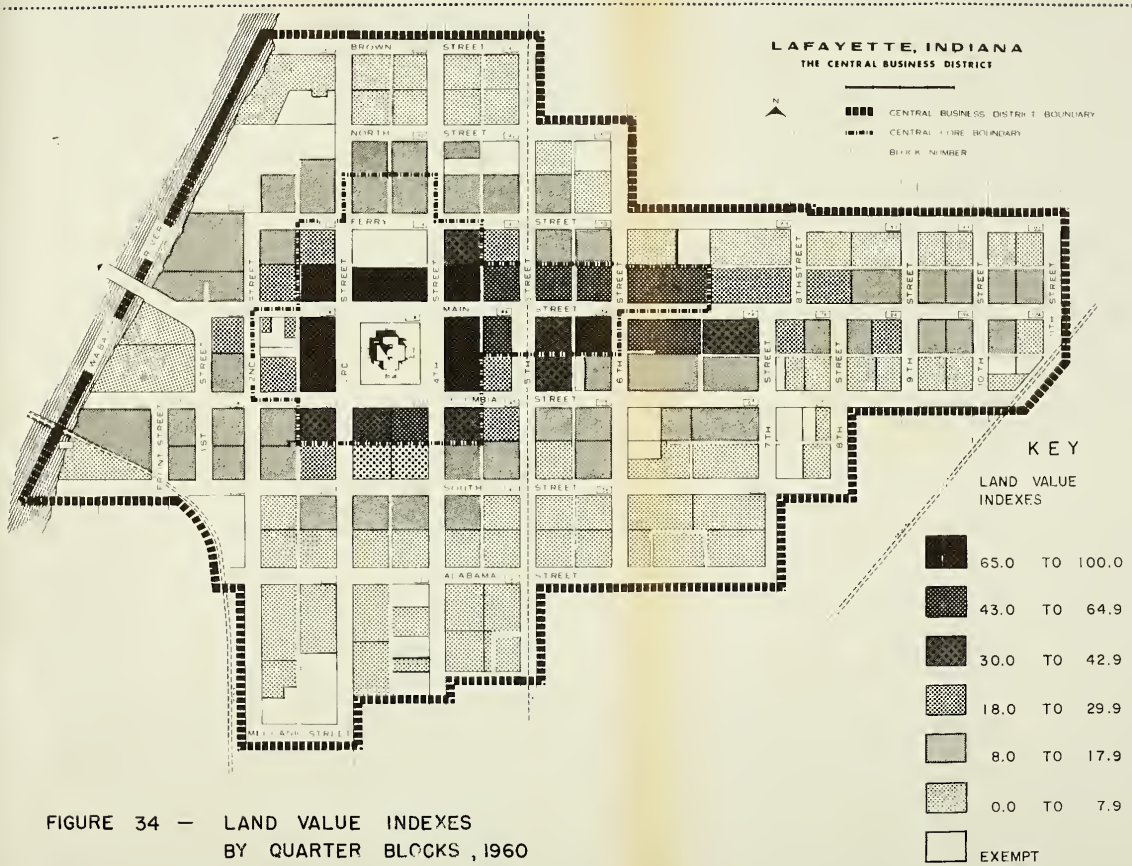


FIGURE 34 — LAND VALUE INDEXES BY QUARTER BLOCKS, 1960

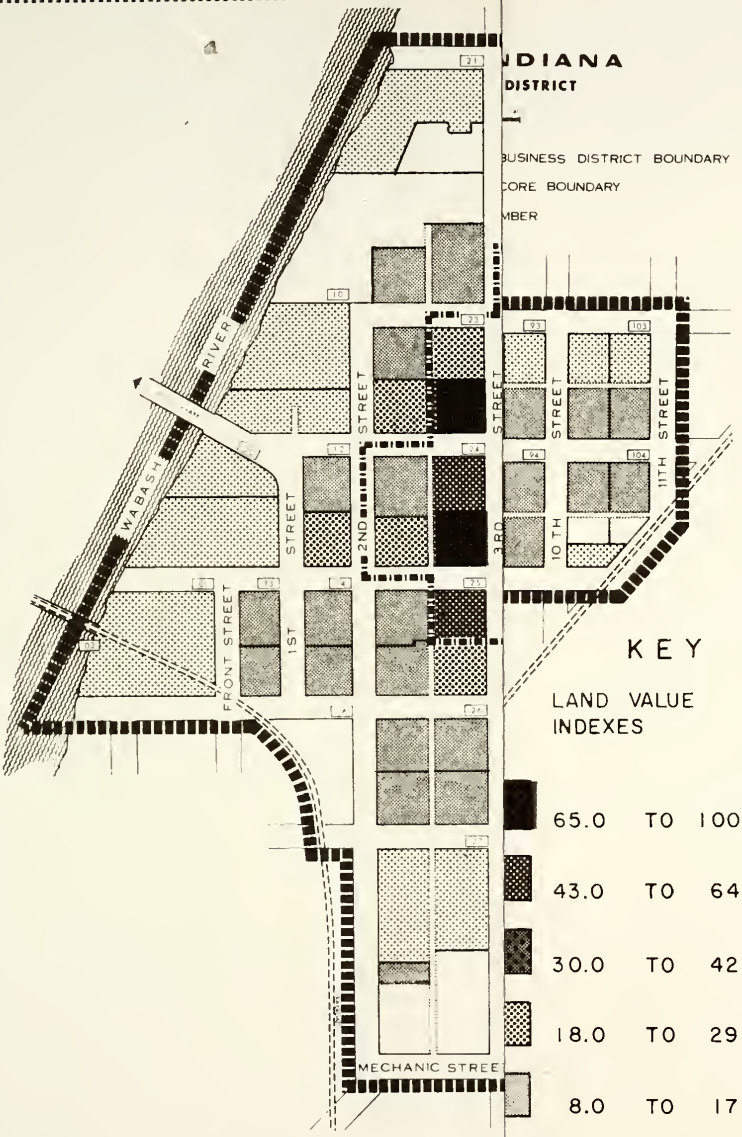


FIGURE 35 — LAND VALU
BY QUARTE

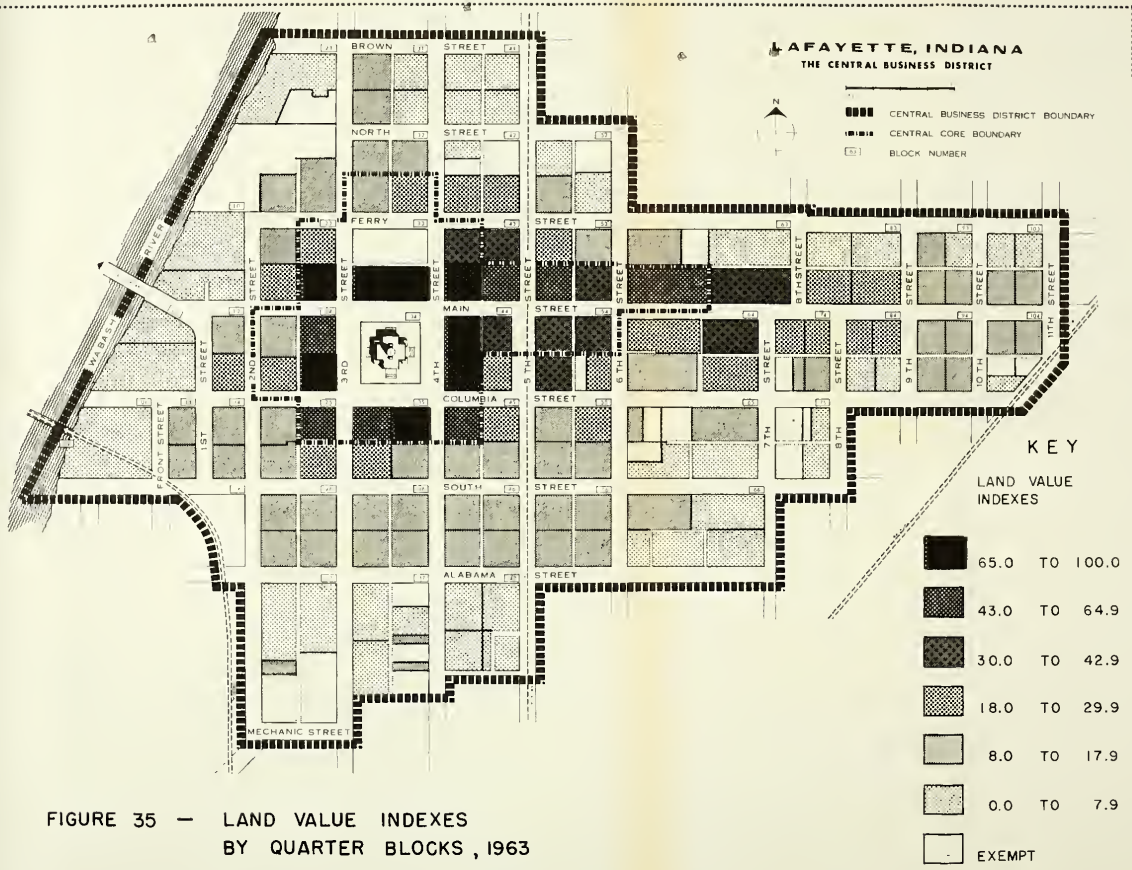


FIGURE 35 — LAND VALUE INDEXES BY QUARTER BLOCKS, 1963

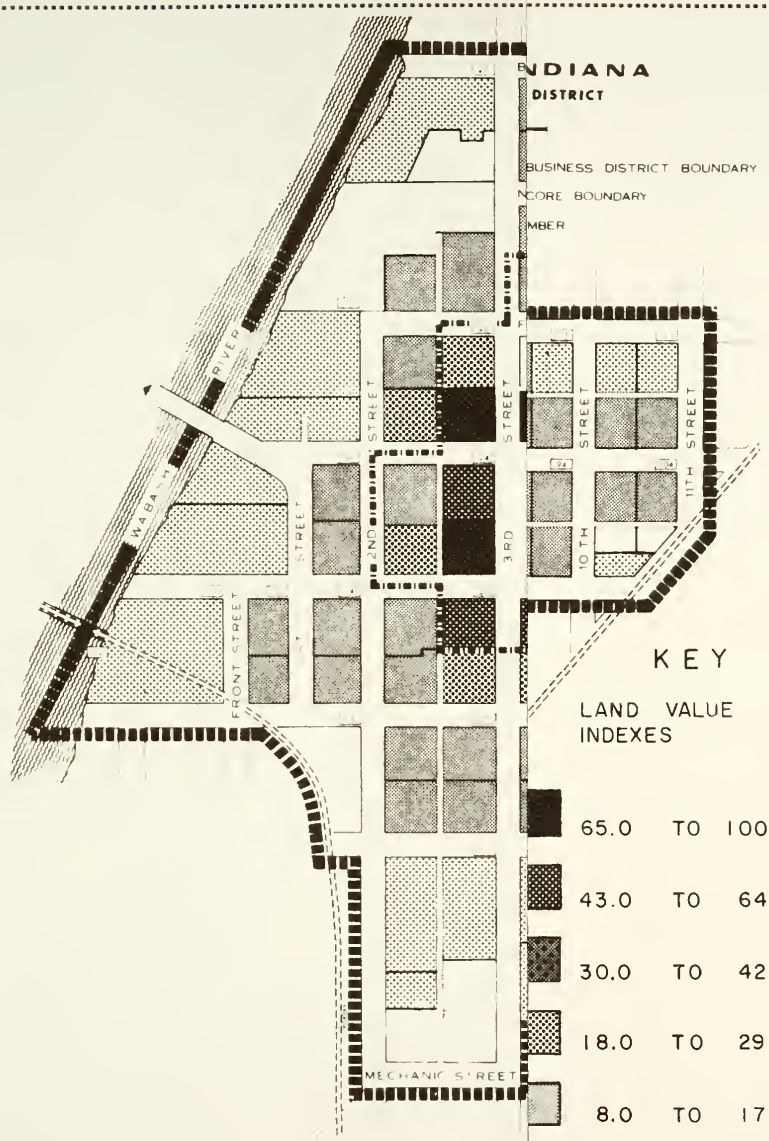


FIGURE 36 — LAND VALUE BY QUARTER

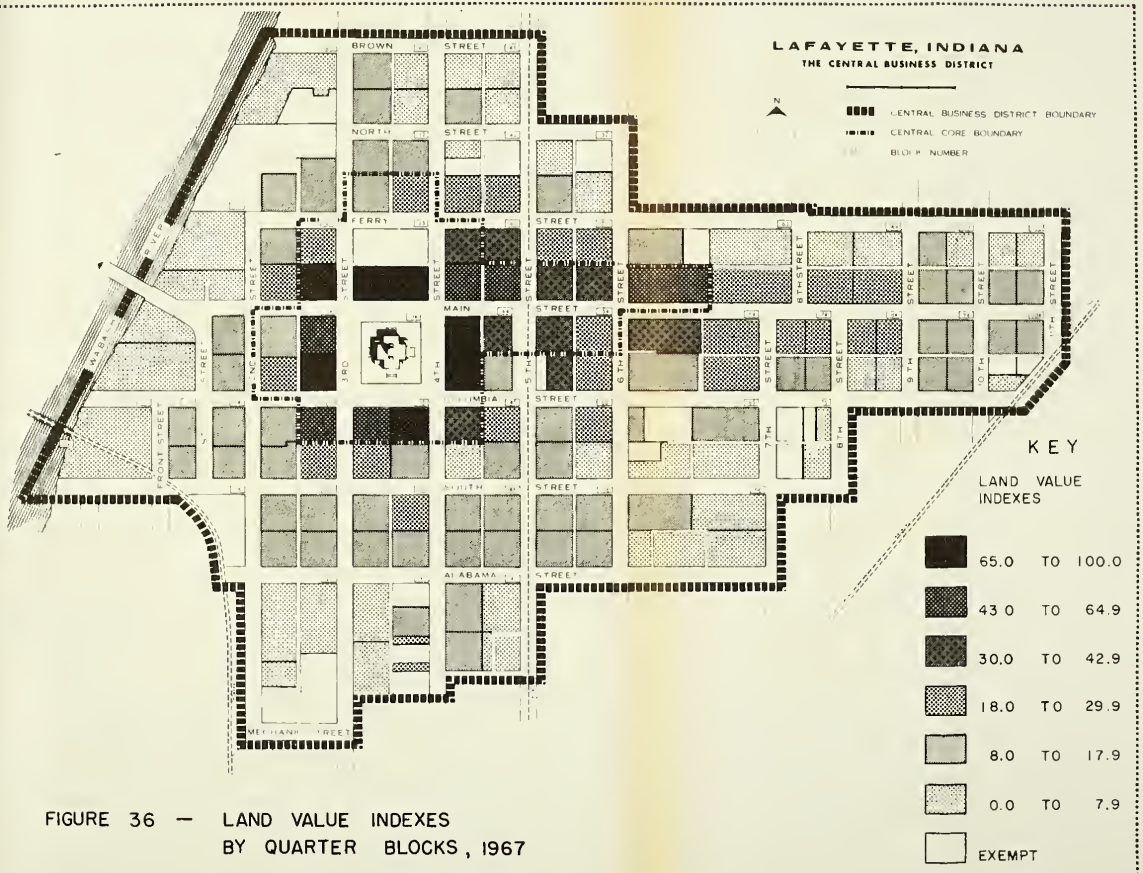


FIGURE 36 — LAND VALUE INDEXES BY QUARTER BLOCKS, 1967

accessibilities of CBD properties. The increased provision of parking facilities in the fringe was also a factor in improving the relative accessibility of fringe properties. This improved accessibility enhanced the usefulness of land in the fringe and hence raised its relative value.

Assessed Valuations on Improvements. Figures 37 through 41 show improvements value indexes by quarter blocks for 1950, 1957, 1960, 1963, and 1967 respectively. In these figures, the index values are not grouped within the same class boundaries used to group land value indexes (Figures 32 through 36). In choosing class boundaries (in each case), the over-all pattern of the indexes' numerical values was taken into consideration. Since this pattern was not similar for land value indexes and improvements value indexes, different class boundaries were used. Improvements valuations vary in relation to size, type of construction, age, and use of structures. Therefore, improvement value indexes do not grade regularly from the peak improvements value point (northeast corner of Main and Third). These indexes, however, are strong indicators of the physical conditions of structures but hardly reflect the locational attributes of a site or the functional characteristics of the activities performed in it.

Figures 37 through 41 indicate that very limited new constructions and major renovations took place in the CBD during the period 1950-1967. Apart from the construction

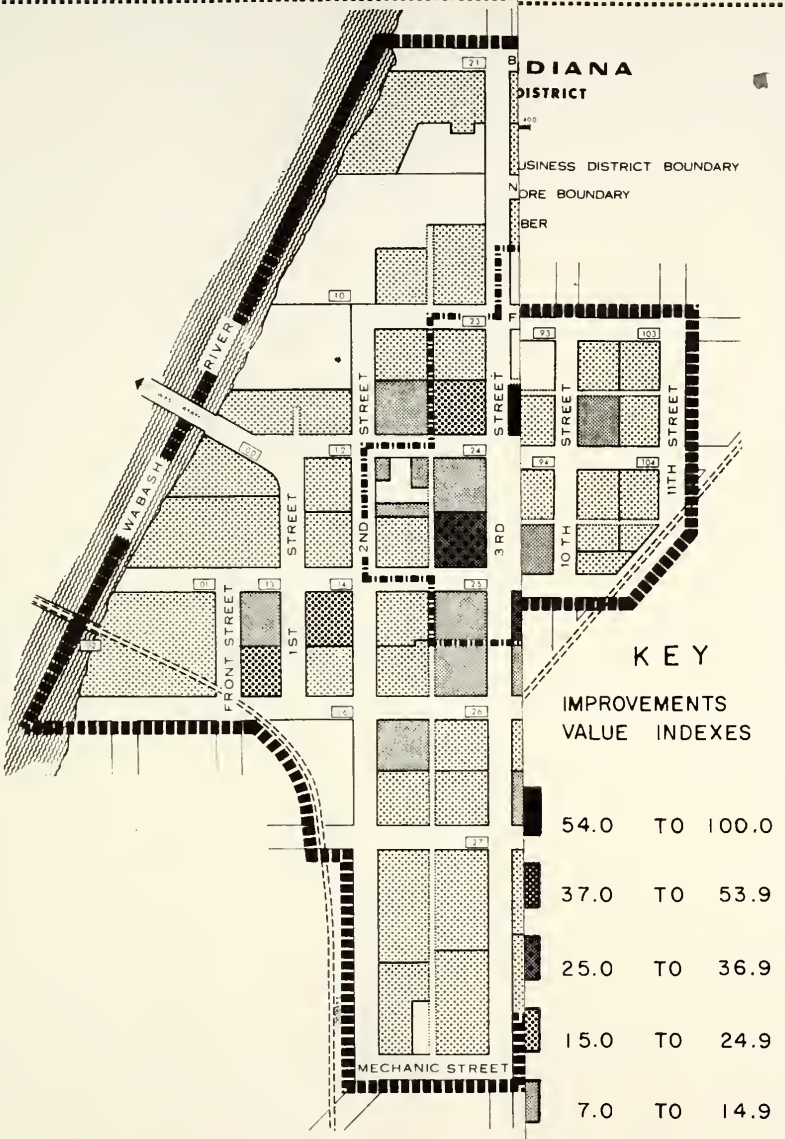


FIGURE 37 — IMPROVEMENT BY QUARTER

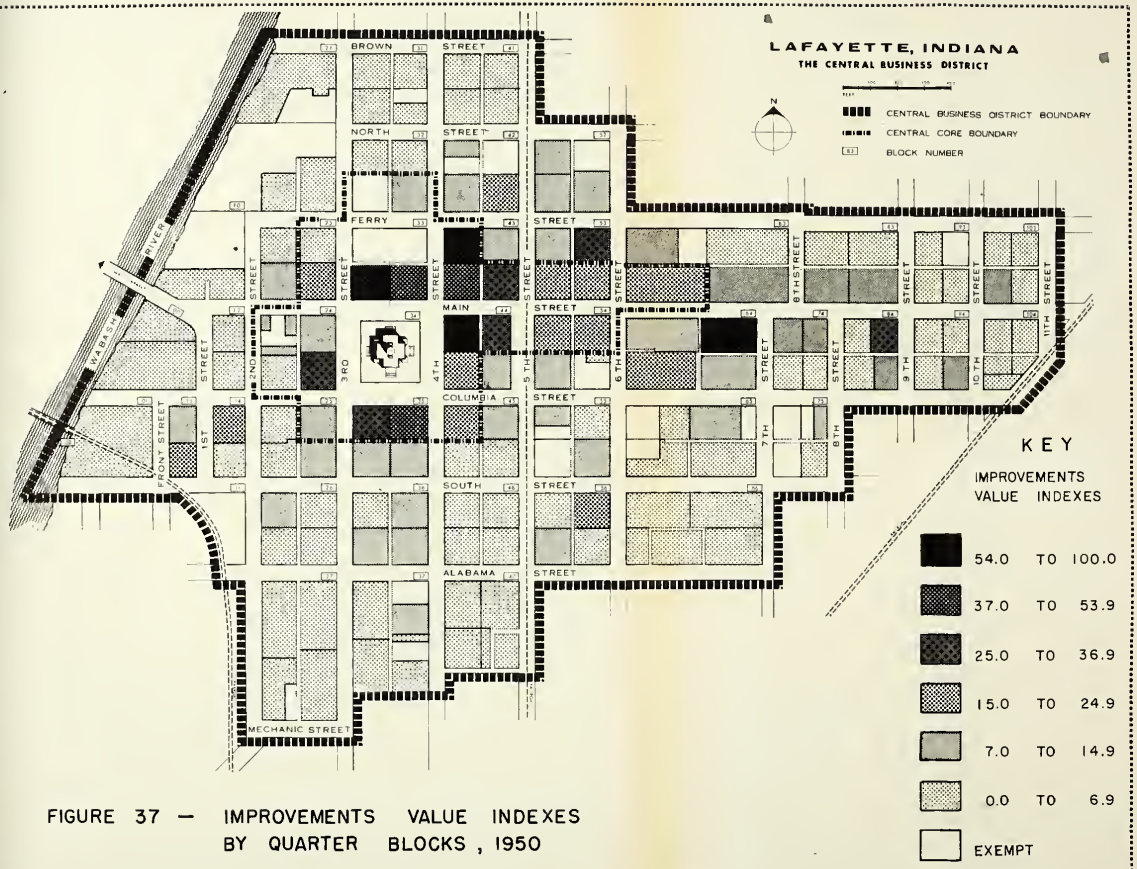


FIGURE 37 — IMPROVEMENTS VALUE INDEXES BY QUARTER BLOCKS, 1950

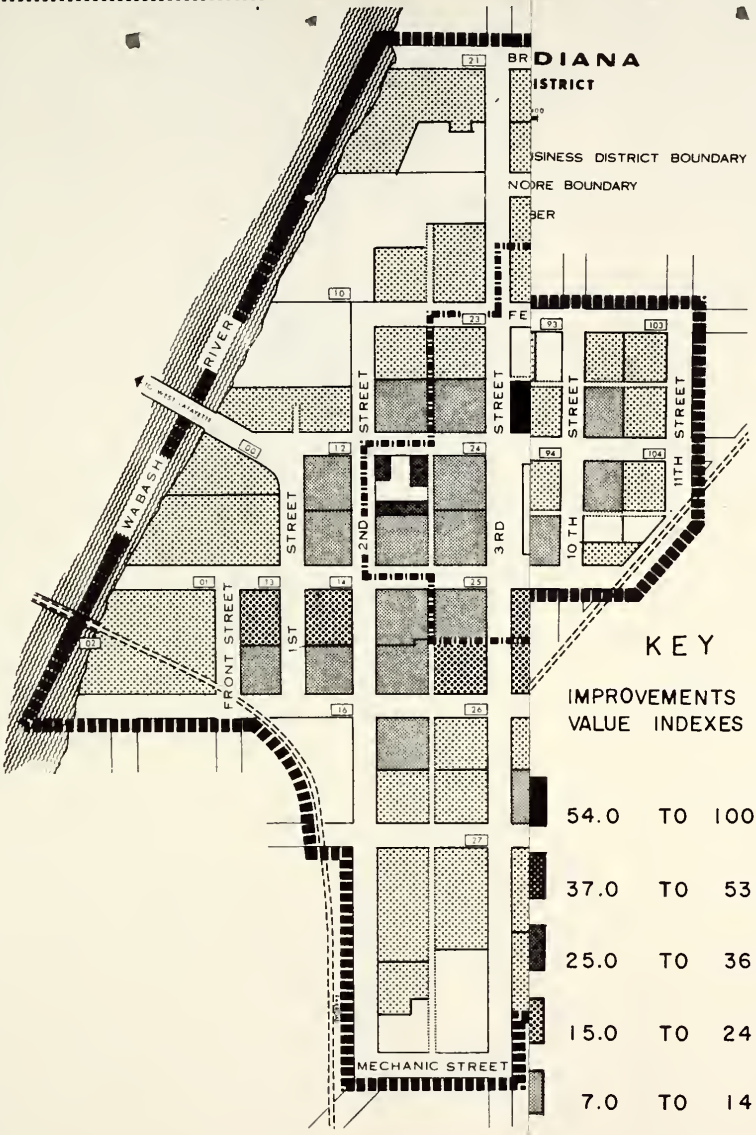


FIGURE 38 — IMPROVEMENT BY QUARTER

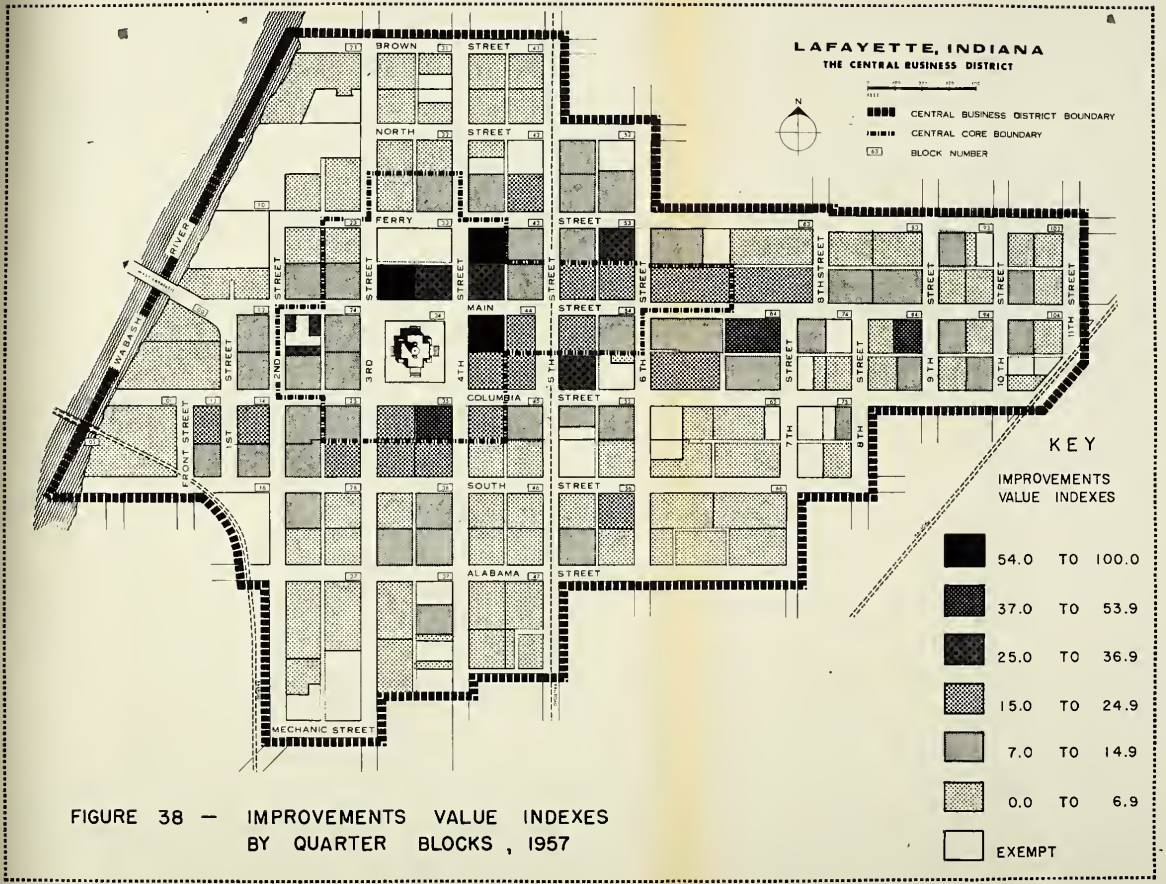


FIGURE 38 — IMPROVEMENTS VALUE INDEXES BY QUARTER BLOCKS, 1957

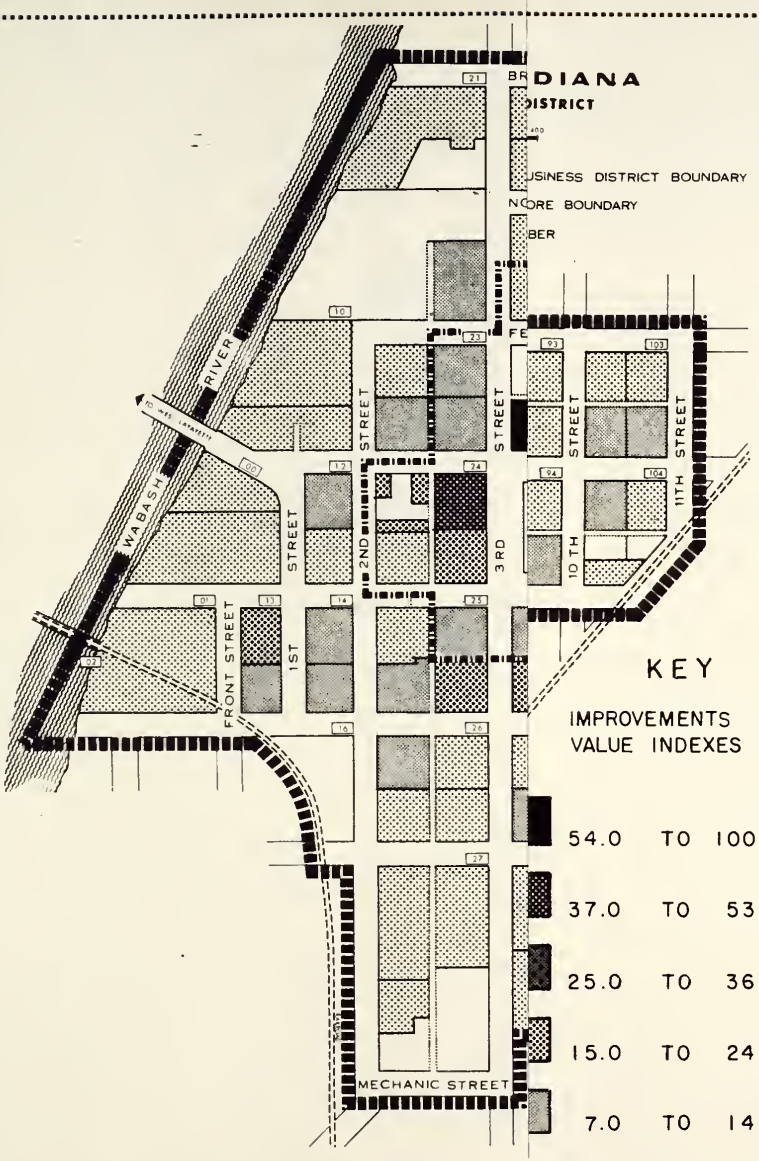


FIGURE 39 — IMPROVEMENT BY QUARTER

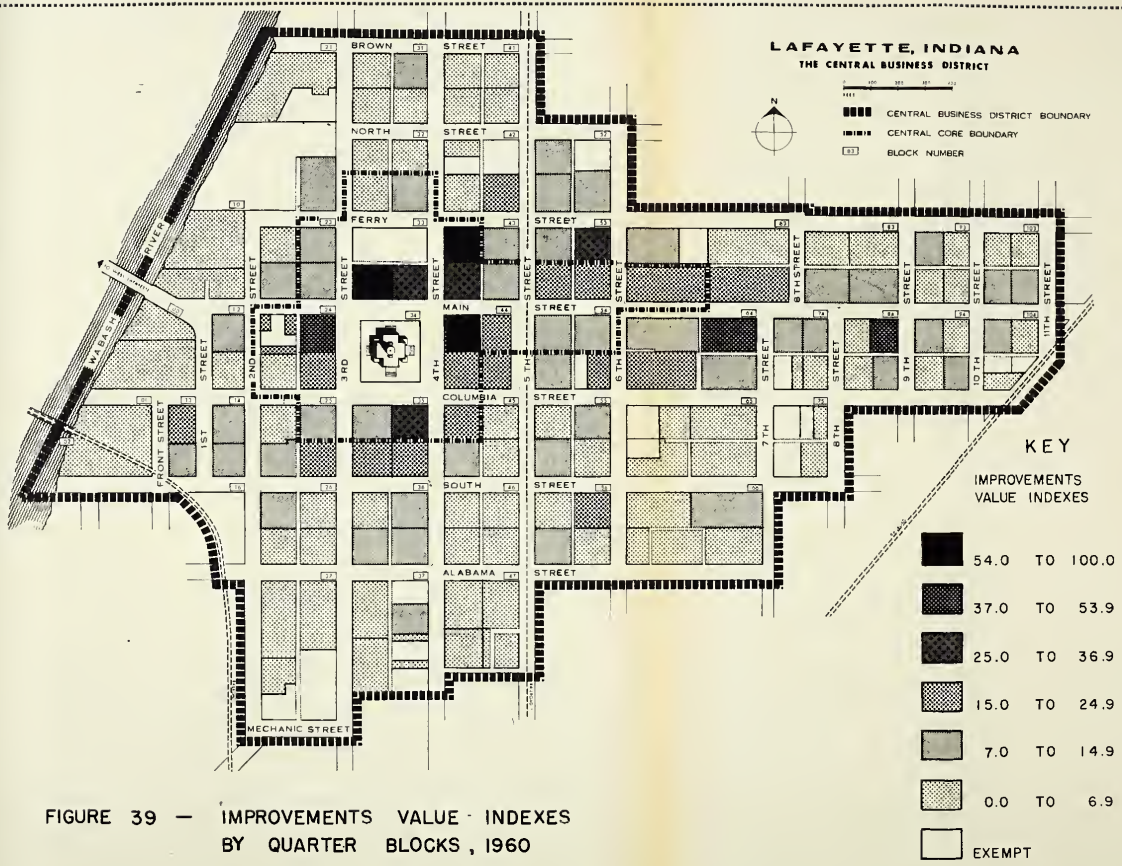


FIGURE 39 — IMPROVEMENTS VALUE INDEXES BY QUARTER BLOCKS, 1960

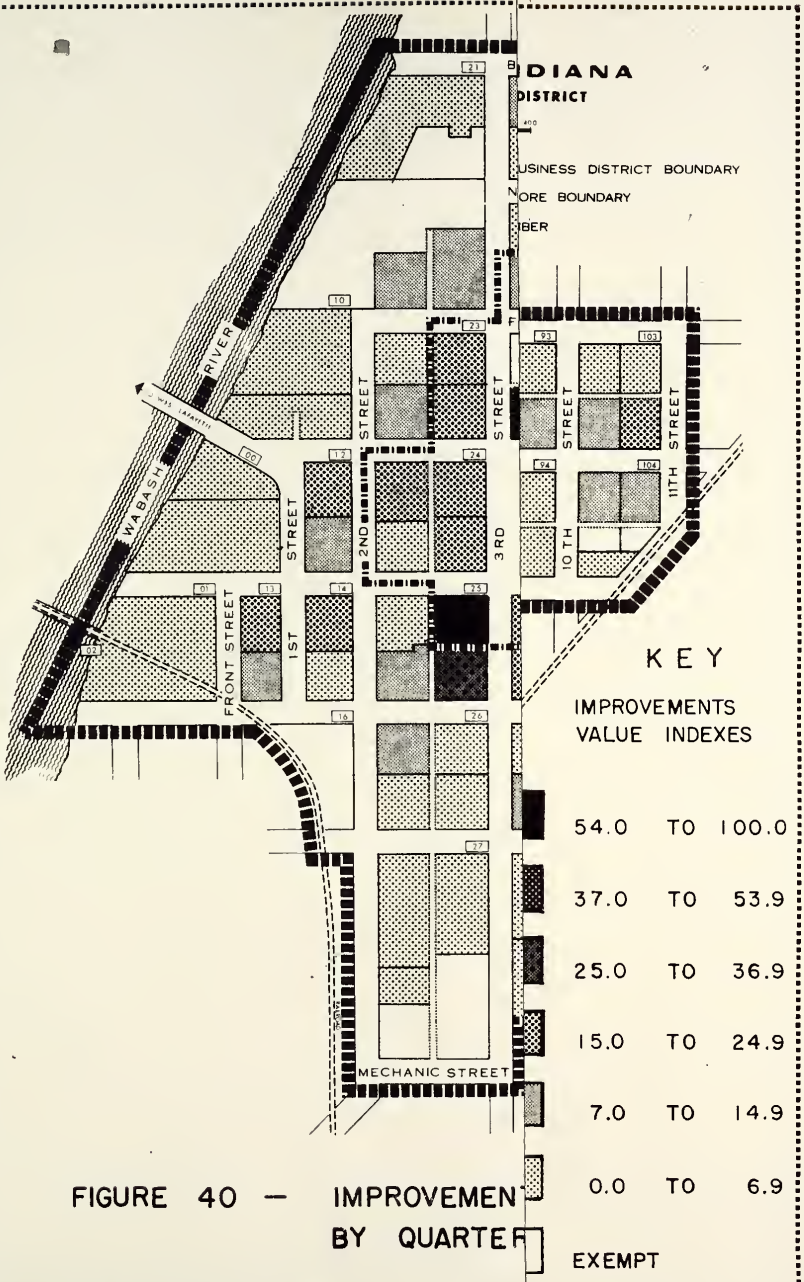


FIGURE 40 — IMPROVEMENT BY QUARTER

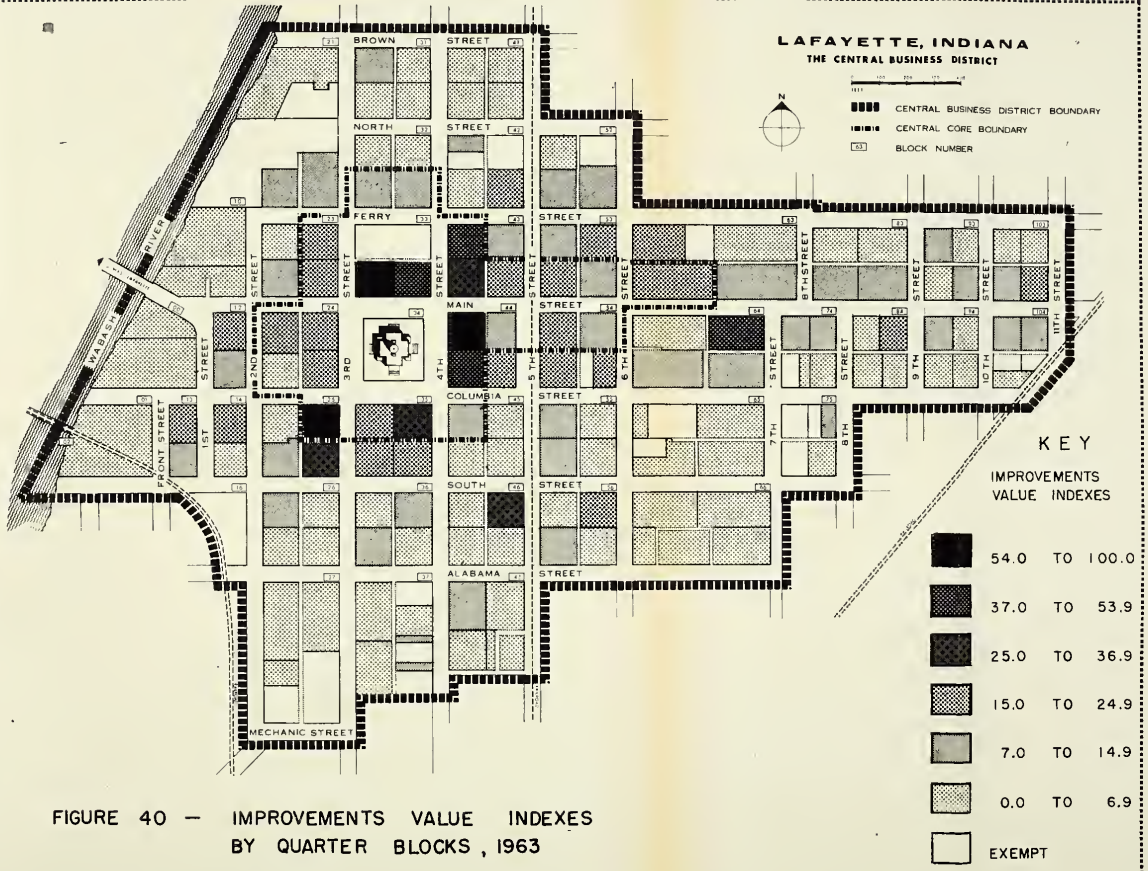


FIGURE 40 — IMPROVEMENTS VALUE INDEXES BY QUARTER BLOCKS, 1963

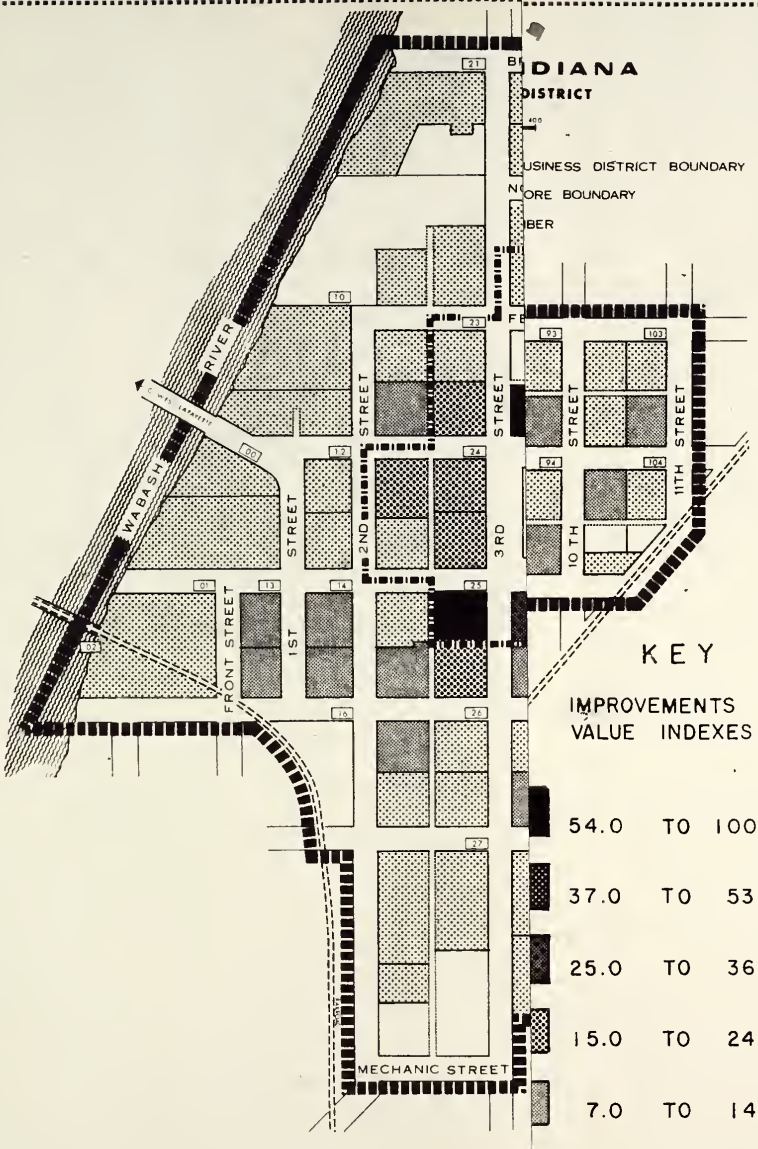


FIGURE 41 — IMPROVEMENTS BY QUARTER

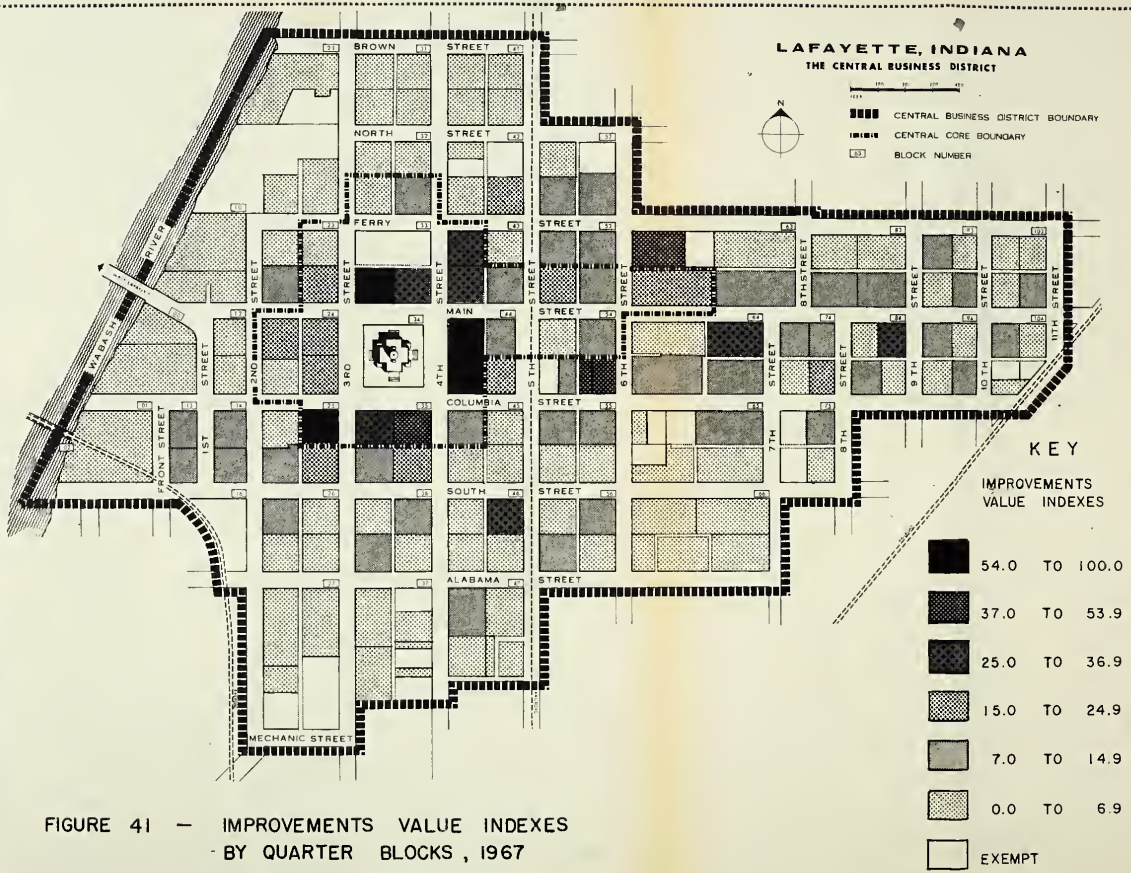


FIGURE 41 — IMPROVEMENTS VALUE INDEXES BY QUARTER BLOCKS, 1967

of Penney's new store (1963 - block 25), the Lafayette National Bank branch on South (1963 - block 46), the First Federal Savings and Loan Association building (1963 - block 44), and the Masonic Temple (1967 - block 54), and the remodeling of the Lafayette Journal and Courier building (1967 - block 63), virtually all other taxable CBD structures were left with no appreciable additions, remodeling, or replacement.

Assessed Valuations on Land and Improvements. The following is an analysis of the relationships between land assessments and improvements assessments in the CBD. From the assessor's point of view, the CBD is an area of fairly homogeneous characteristics. Its land use is classified (for evaluation purposes) as commercial - central district. The ratios of land values to improvements values applied in the assessment of CBD properties are based on the assessor's estimates of commercial land capacity under conditions of "highest and best utilization of land." Land capacity is defined as "...the ability of land to absorb additional units of labor and capital [improvements] profitably" (37, p. 26).

Basically, the amount of net income which can be procured from a parcel of land is limited by the concept of diminishing returns. Additional investments in improvements will yield an increasing residual income to land until a maximum of income per unit of investment is reached. Any

further improvements will yield diminishing returns until a point is reached where no additional return accrues. It follows that both under- and overimprovement of land constitute a deviation from the concept of highest and best utilization of land.

Under ideal conditions of highest and best utilization of CBD land, and provided that assessments are equitable and further that they are based on a relatively narrow range of land-to-improvements ratios, the distributions of land value indexes and improvements value indexes should be expected to follow similar patterns. In other words, for a given reference year, the quarter block which ranked highest in land assessment should be expected to rank highest in improvements assessment. The same should be expected for the quarter block with the second highest rank, and so on. Therefore, the discrepancies observed between the actual distributions of land value indexes and improvements value indexes reflect inefficiencies in the utilization of land. The greater the discrepancies, the less efficient is the utilization of land. By comparing quarter blocks' land assessment ranks with their improvements assessment ranks for a given reference year, underimprovements, overimprovements, and efficient land utilizations can be located. The changes, over the study period, in these inefficiencies can also be traced.

These comparisons were made for 1950 and 1967. For each of these two years, CBD quarter blocks were ranked both

according to their land value indexes and according to their improvements value indexes. The quarter block having the highest index was assigned a rank of 1, the one having the second highest index, a rank of 2, and so on. For each quarter block, the improvements value rank was subtracted from the land value rank. Positive differences indicated overimprovements, negative differences, underimprovements, and zero differences, efficient land utilizations. Figures 42 and 43 show the results of these comparisons for 1950 and 1967 respectively. The observed differences between land value ranks and improvements value ranks ranged between +99 and -109. These differences were grouped into five classes:

1. +41 or more (noted as considerably overimproved land),
2. +8 to +40 (noted as overimproved land),
3. -7 to +7 (noted as efficiently utilized land),
4. -8 to -40 (noted as underimproved land), and
5. -41 or less (noted as considerably underimproved land)

From Figures 42 and 43, a number of observations can be made. In 1950, most of the land in the core was efficiently utilized. However, few quarter blocks were underimproved and only two were overimproved (Fowler Hotel, block 43, and Kettelhut Building, block 32). In the fringe, land was less efficiently utilized. Along Main, Columbia, and South Streets, a substantial proportion of quarter blocks

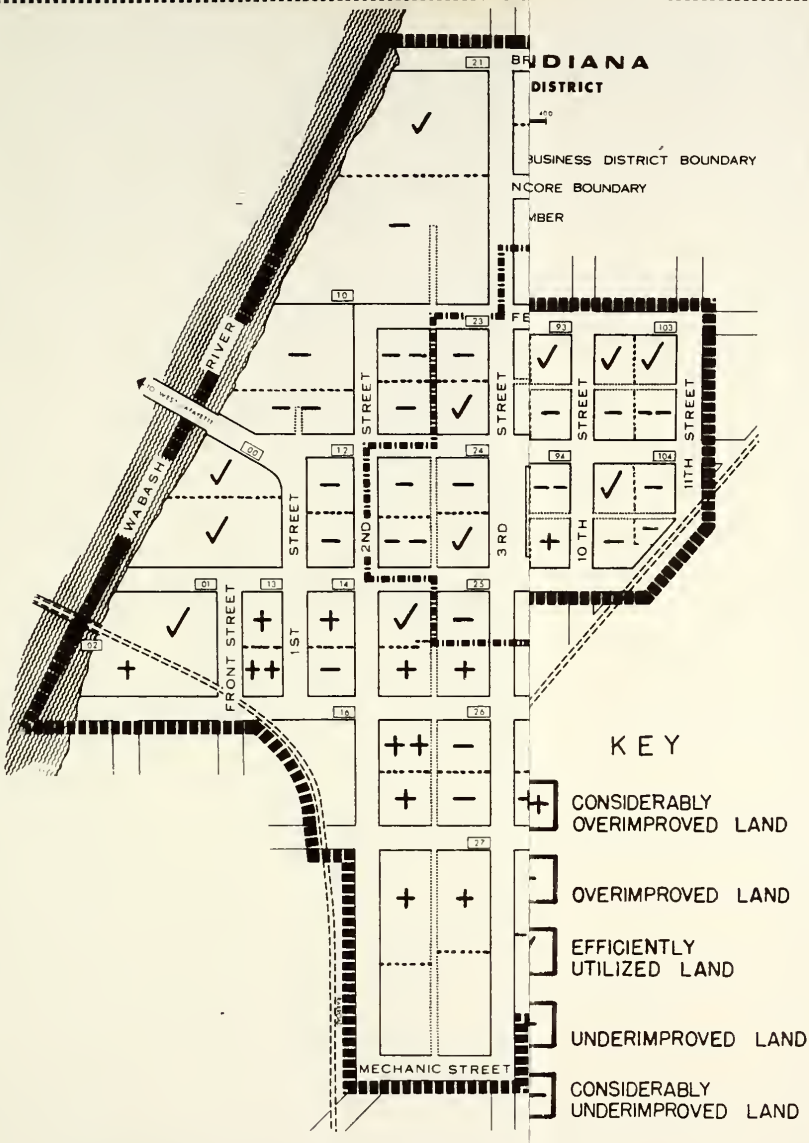


FIGURE 42 — EXTENT OF

TO LAND V

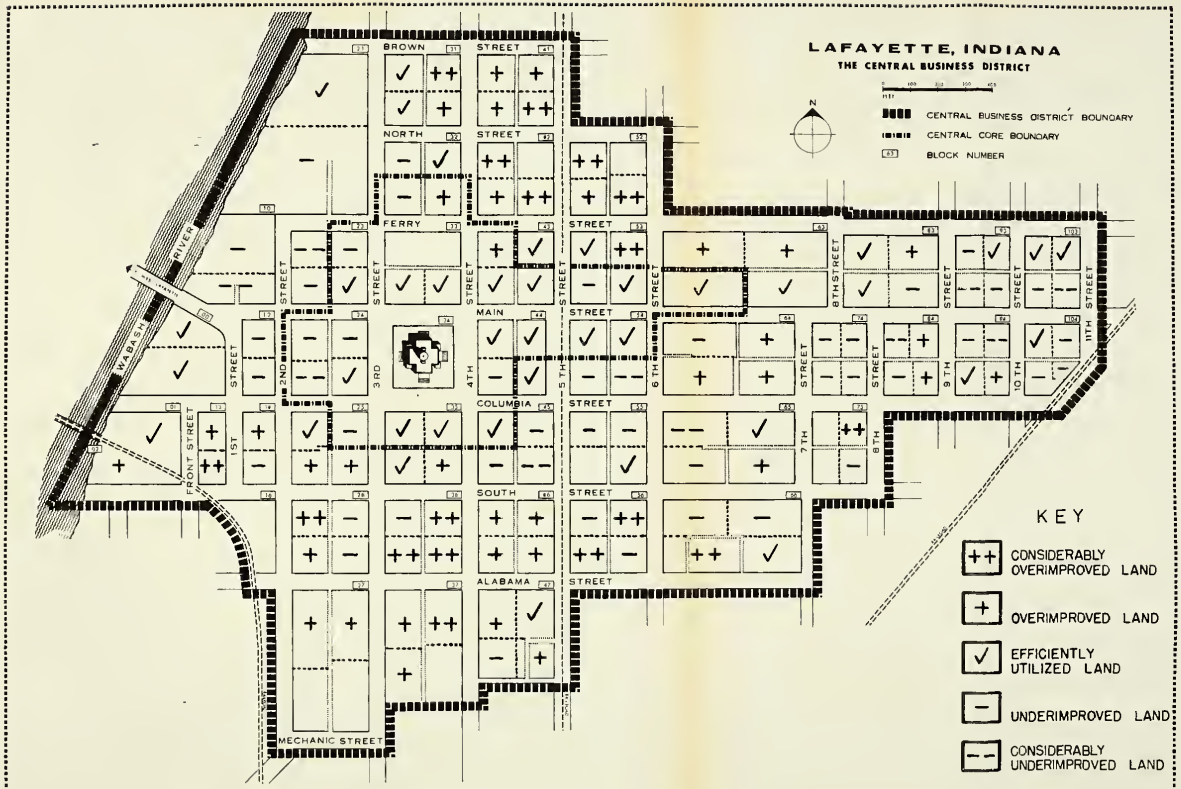


FIGURE 42 — EXTENT OF LAND IMPROVEMENTS IN RELATION TO LAND VALUES BY QUARTER BLOCKS, 1950

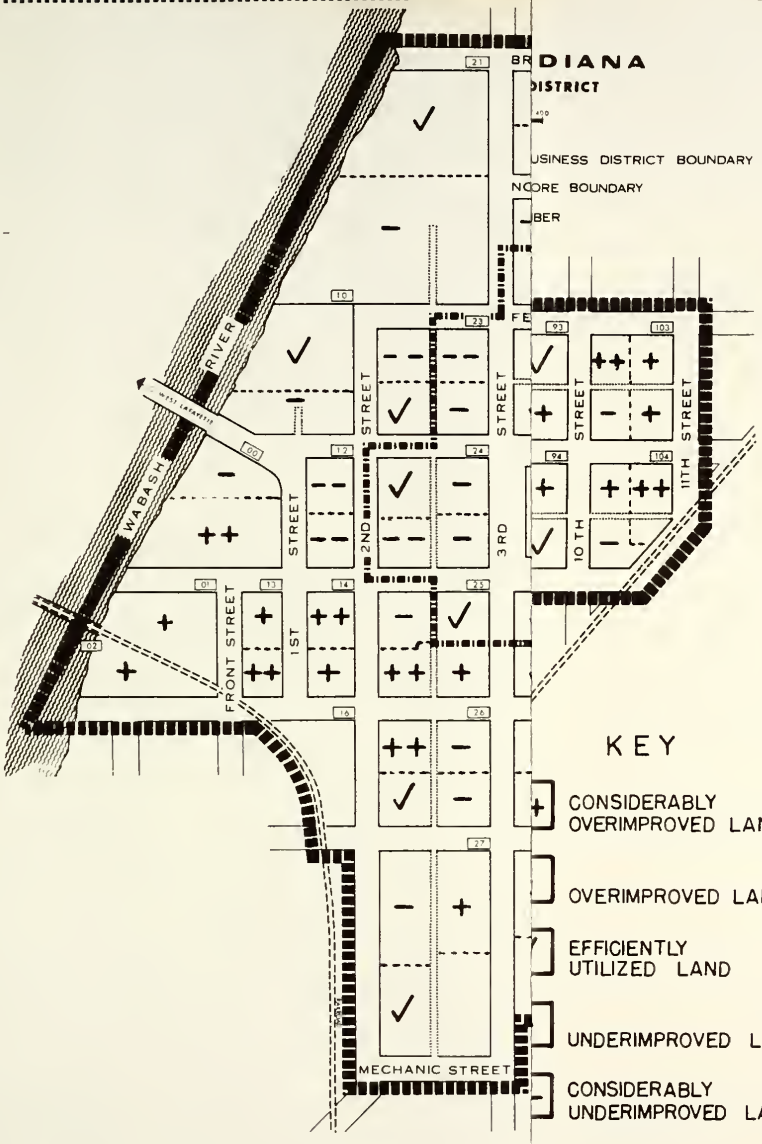


FIGURE 43 — EXTENT OF
TO LAND V

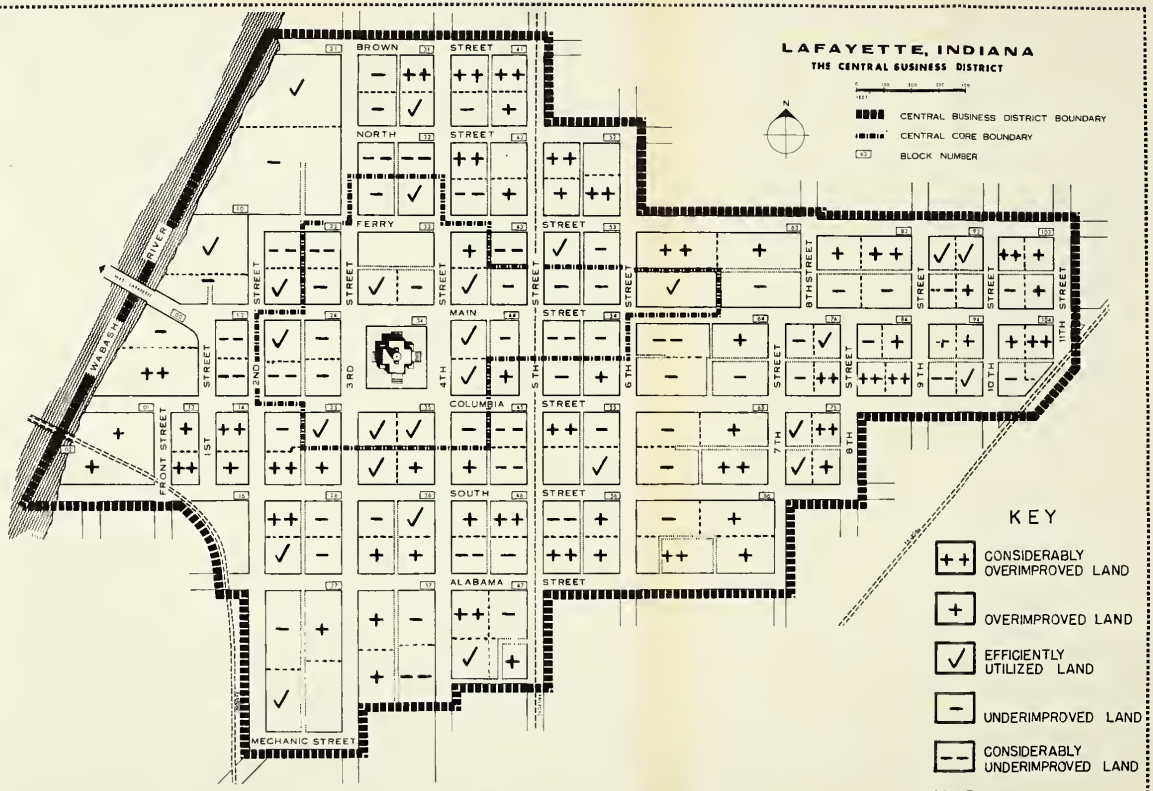


FIGURE 43 – EXTENT OF LAND IMPROVEMENTS IN RELATION TO LAND VALUES BY QUARTER BLOCKS, 1967

were underimproved.

In 1967, underimprovements tended to increase; especially in the core. During the study period, overimprovements decreased mainly in the fringe. The trend toward less overimprovements and more underimprovements may be due to the fact that improvements depreciate over time while land either remains constant in value or even appreciates. The trend also reflects the general lack of maintenance, remodeling, and replacement of CBD structures.

Employment

Two aspects of the internal CBD employment changes are considered: (1) changes in the total numbers of employees by quarter blocks, and (2) changes in the average numbers of employees per employer by quarter blocks.

Figures 44 through 48 show the total numbers of employees by quarter blocks for 1950, 1957, 1960, 1963, and 1967 respectively. In 1950, almost all the quarter blocks with more than 60 employees tended to concentrate either in the core or close to it. These quarter blocks also tended to cluster along Main Street probably for proximity to the main mass transportation lines along this street. In subsequent years, the same pattern prevailed although it was much less pronounced. The increasing use of the automobile for work trips coupled with the increasing supply of parking in the fringe seemed to have relaxed the locational restrictions

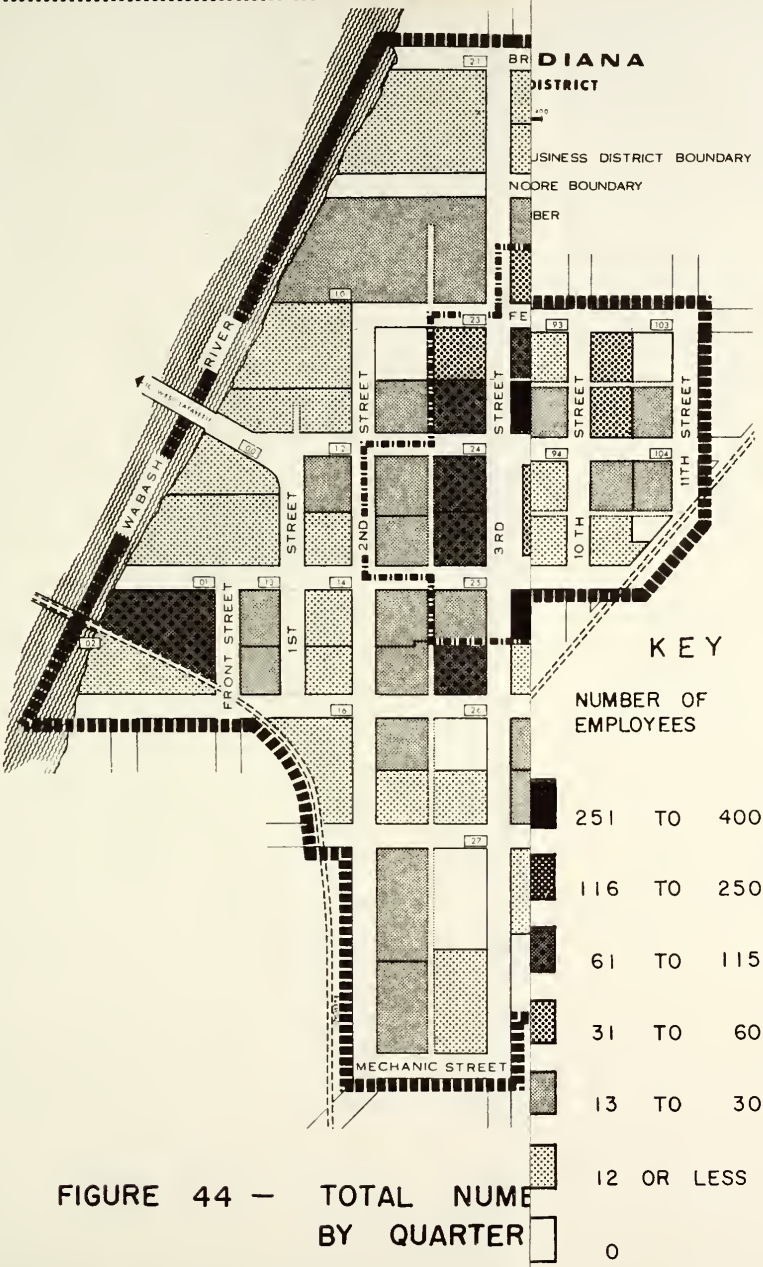


FIGURE 44 — TOTAL NUME
BY QUARTER

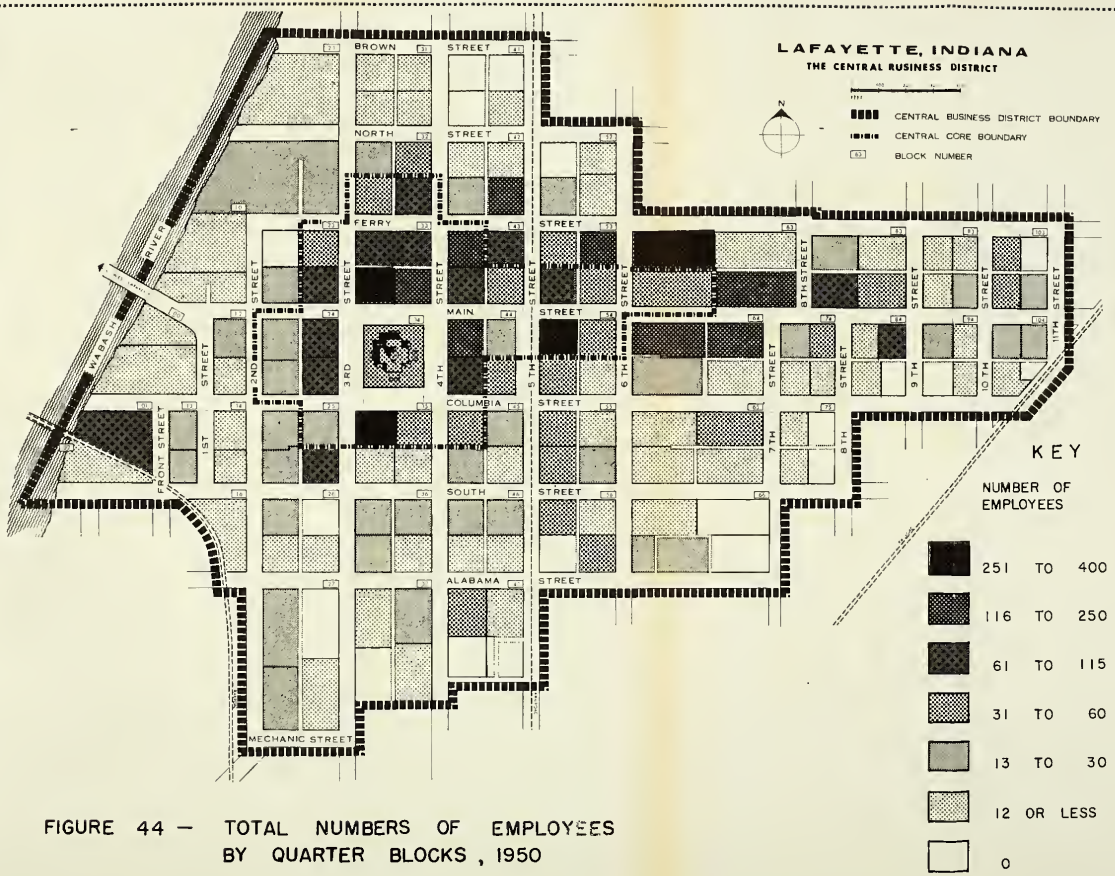


FIGURE 44 — TOTAL NUMBERS OF EMPLOYEES BY QUARTER BLOCKS, 1950

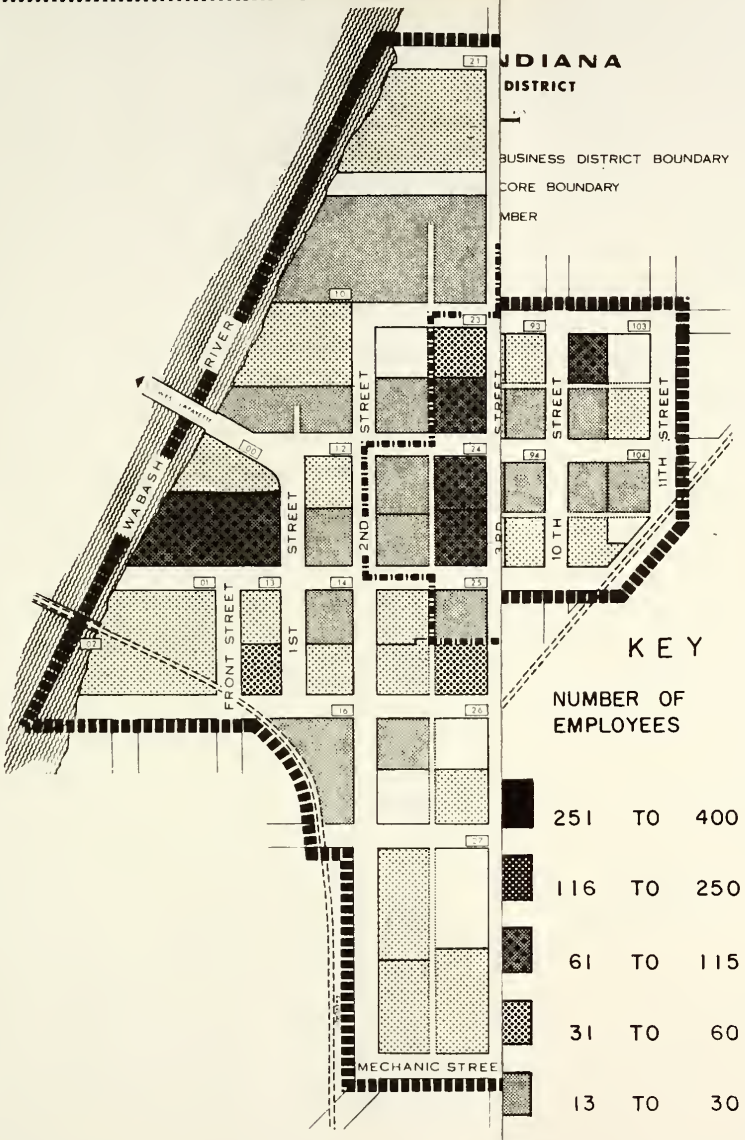


FIGURE 45 — TOTAL NUM
BY QUARTE

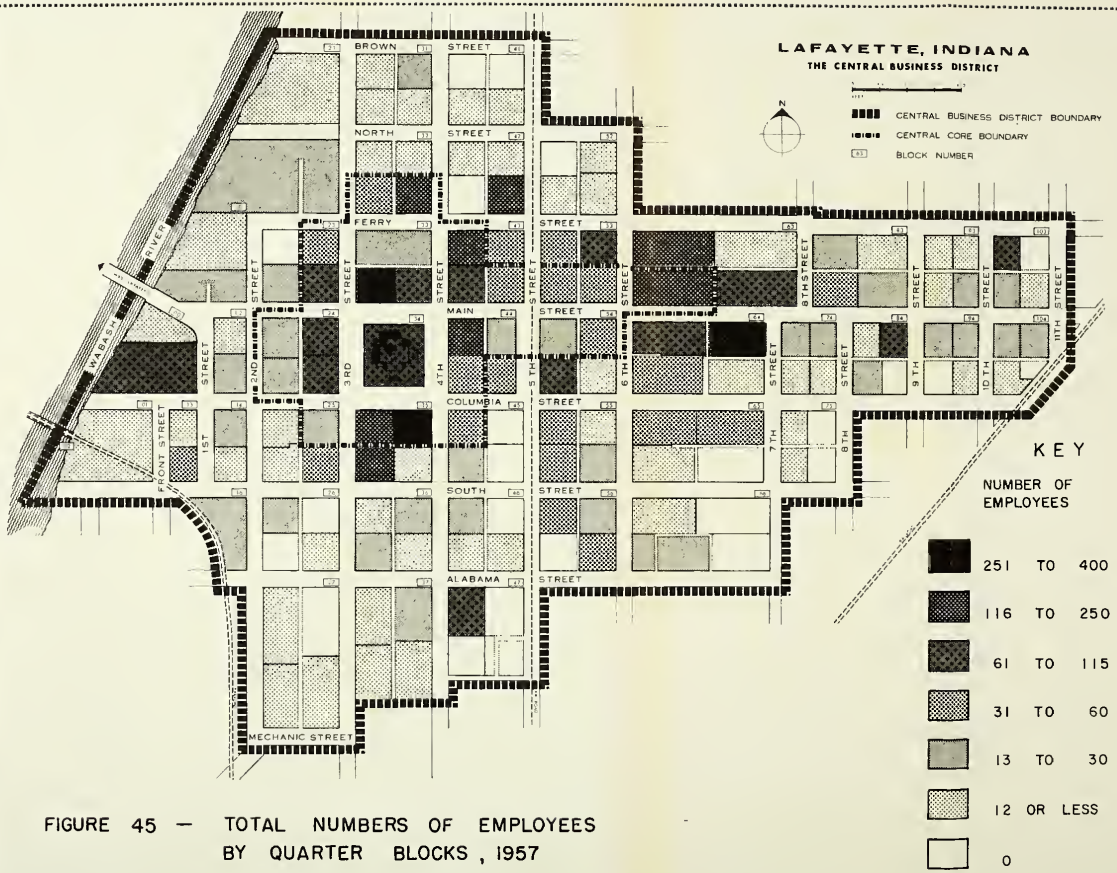


FIGURE 45 — TOTAL NUMBERS OF EMPLOYEES BY QUARTER BLOCKS, 1957

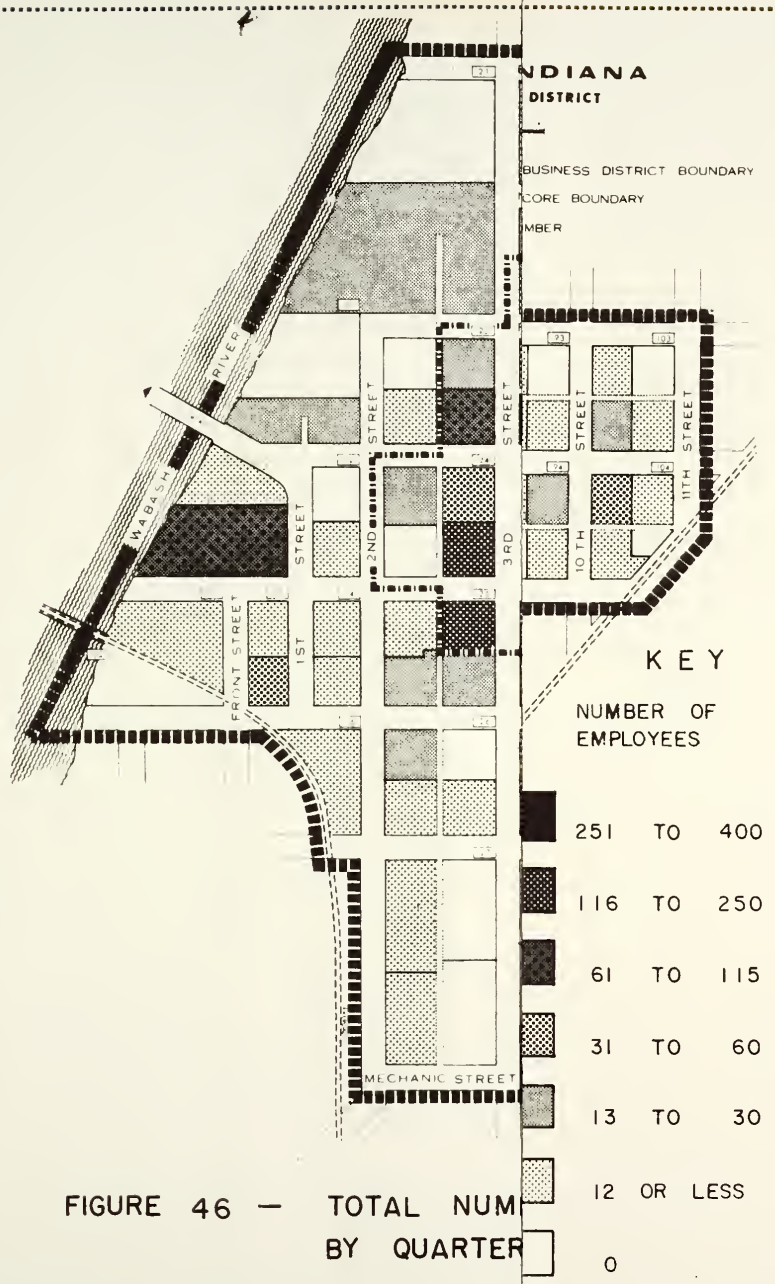


FIGURE 46 — TOTAL NUM
BY QUARTER

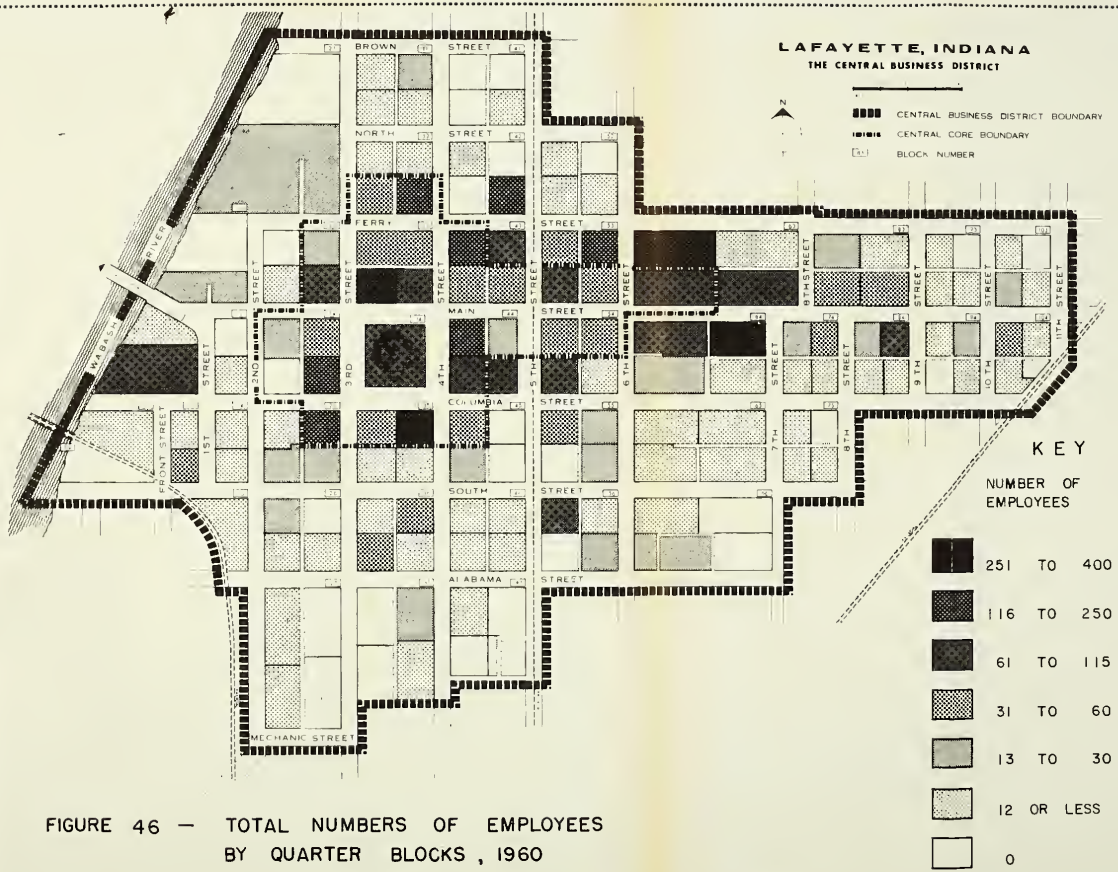


FIGURE 46 — TOTAL NUMBERS OF EMPLOYEES BY QUARTER BLOCKS, 1960

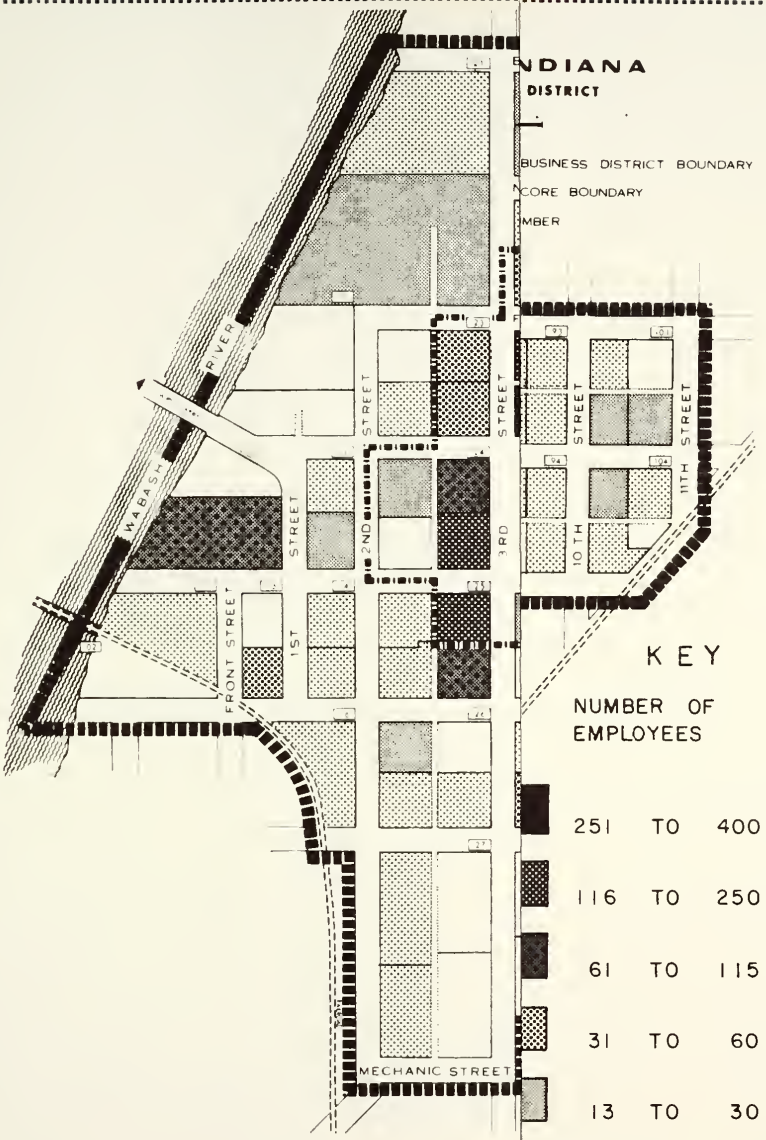


FIGURE 47 — TOTAL NUM
BY QUARTE

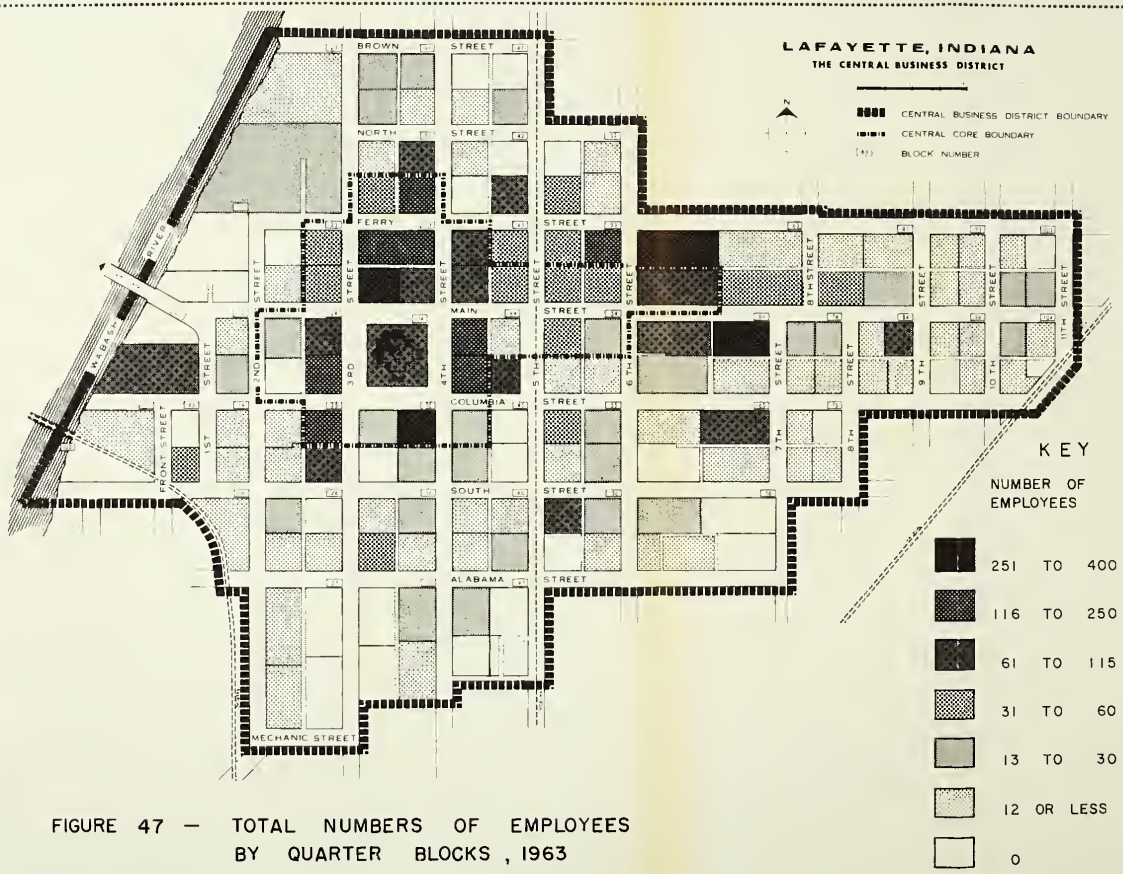


FIGURE 47 — TOTAL NUMBERS OF EMPLOYEES BY QUARTER BLOCKS, 1963

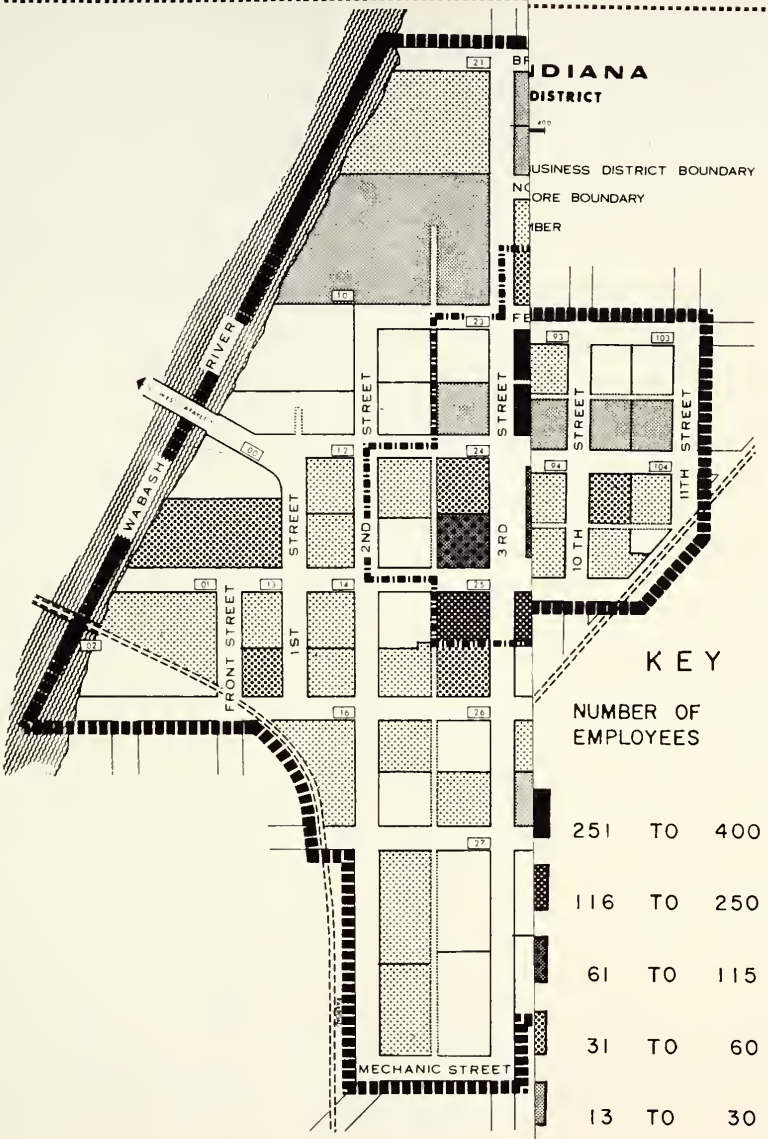


FIGURE 48 — TOTAL NUM
BY QUARTER

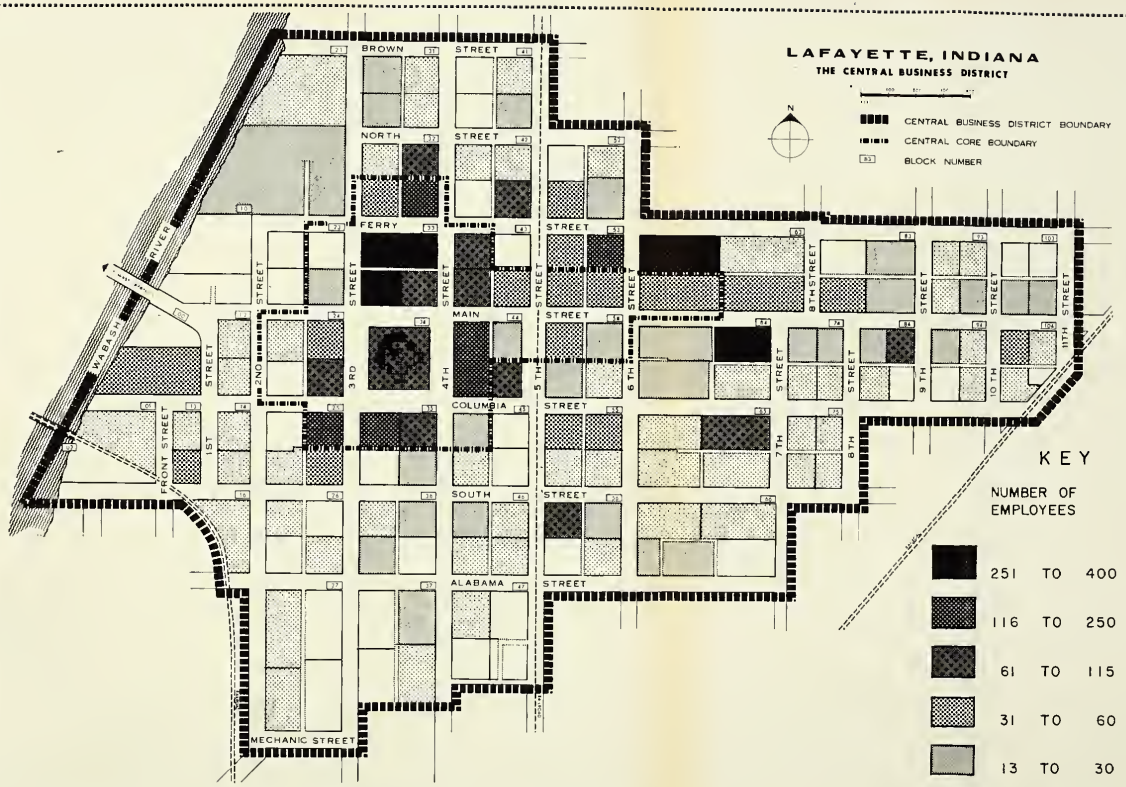


FIGURE 48 — TOTAL NUMBERS OF EMPLOYEES BY QUARTER BLOCKS, 1967

on employers and thus resulted in more scattered employment patterns.

Figures 49 through 53 show the average numbers of employees per employer by quarter blocks for 1950, 1957, 1960, 1963, and 1967 respectively. Employers in the CBD were predominantly small employers. In 1950, about 72 percent of the CBD employers had less than four employees. In 1967, this proportion dropped to about 68 percent. Throughout the study period, large CBD employers were mostly located in the fringe. The fact that core quarter blocks had relatively high total numbers of employees was mainly due to the large number of small employers in these quarter blocks. In 1960 and subsequent years, the core started to gain in numbers of large employers.

In the fringe, the scatter of quarter blocks with high average employment per employer is indicative of the general functional character of these employers. Basically, these are either non-customer oriented functions (e.g., telephone communication [471] in block 64, publishing industries [270] in blocks 47 and 63, and executive functions [671] in block 65) or highly automobile oriented (e.g., motor vehicle retail [551] in block 66 and automobile repair services [641] in blocks 13 and 56).

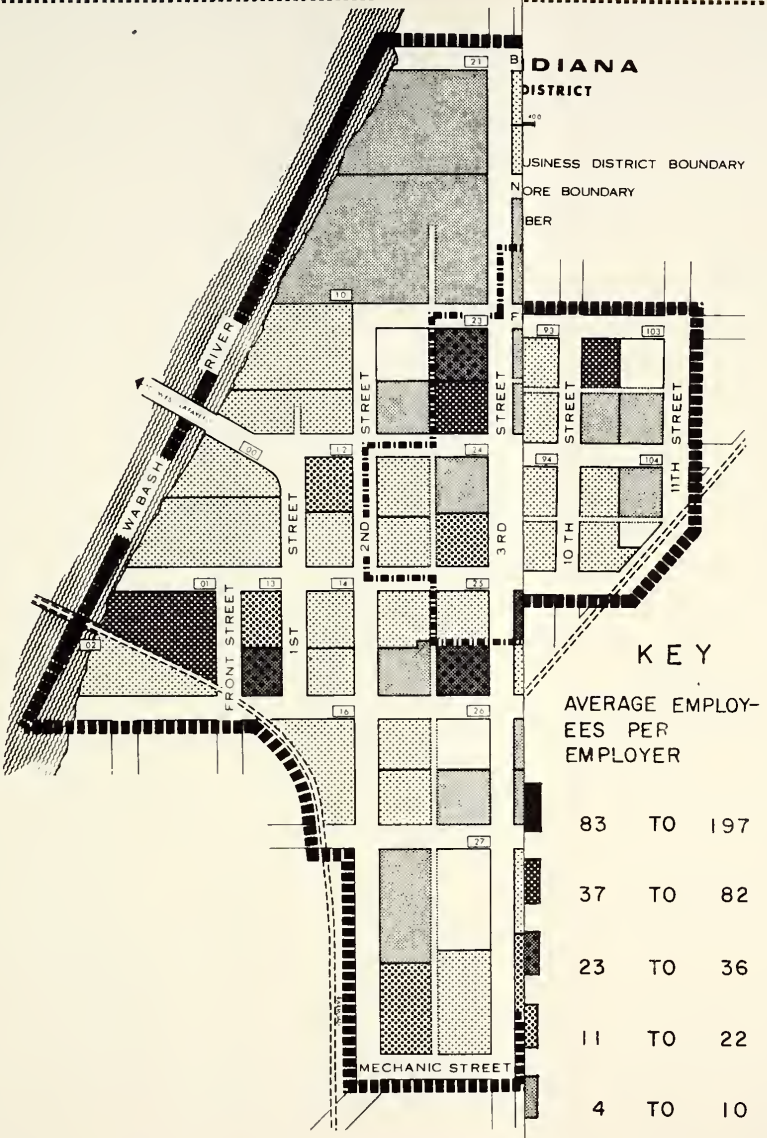


FIGURE 49 — AVERAGE NU
BY QUARTER

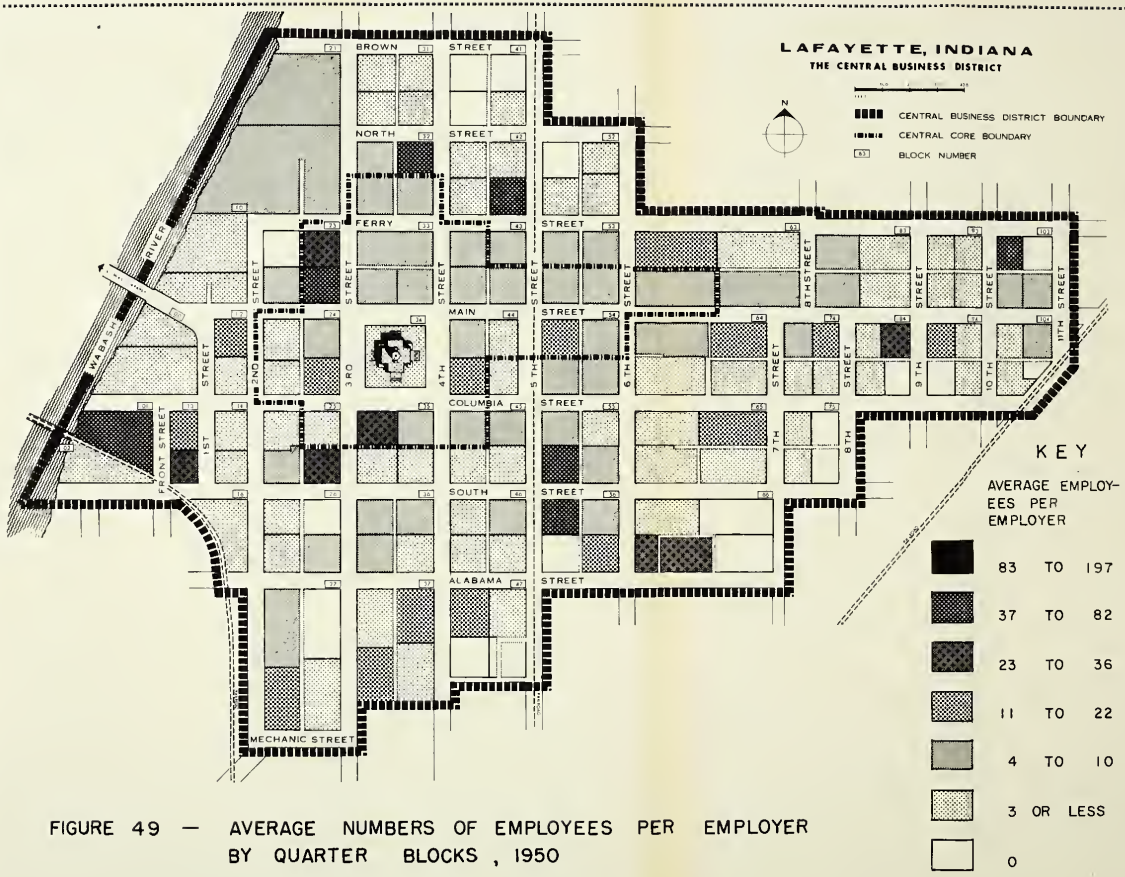


FIGURE 49 — AVERAGE NUMBERS OF EMPLOYEES PER EMPLOYER BY QUARTER BLOCKS, 1950

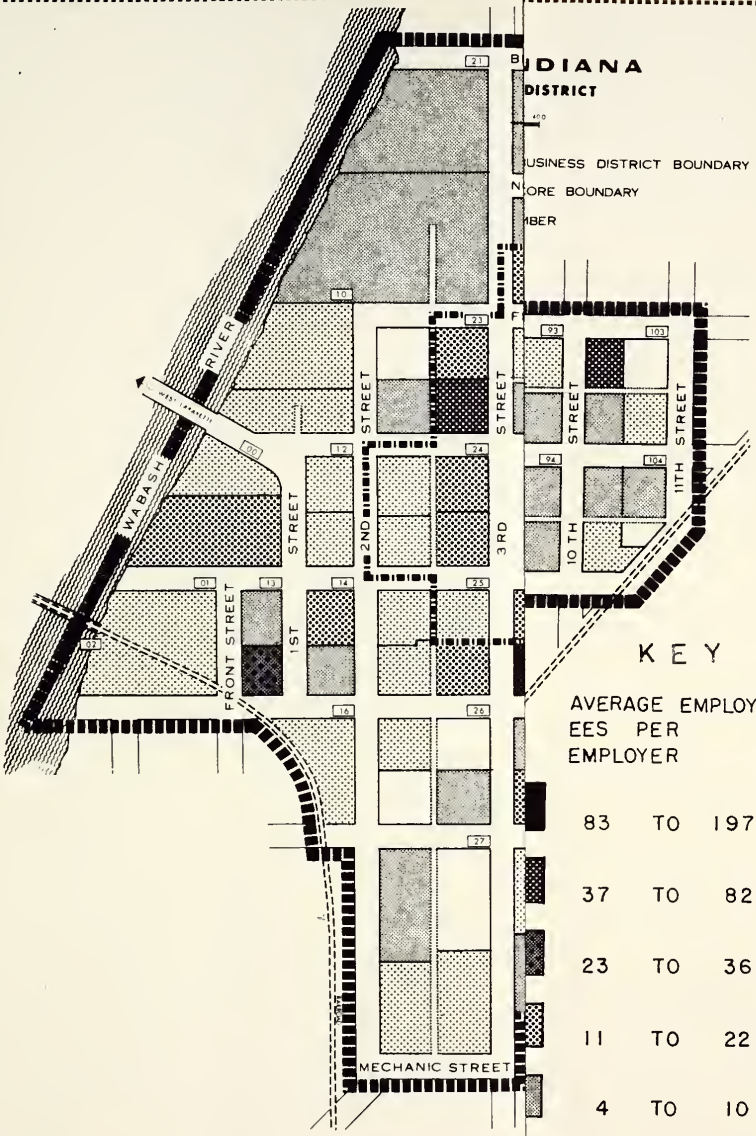


FIGURE 50 — AVERAGE N
BY QUARTE

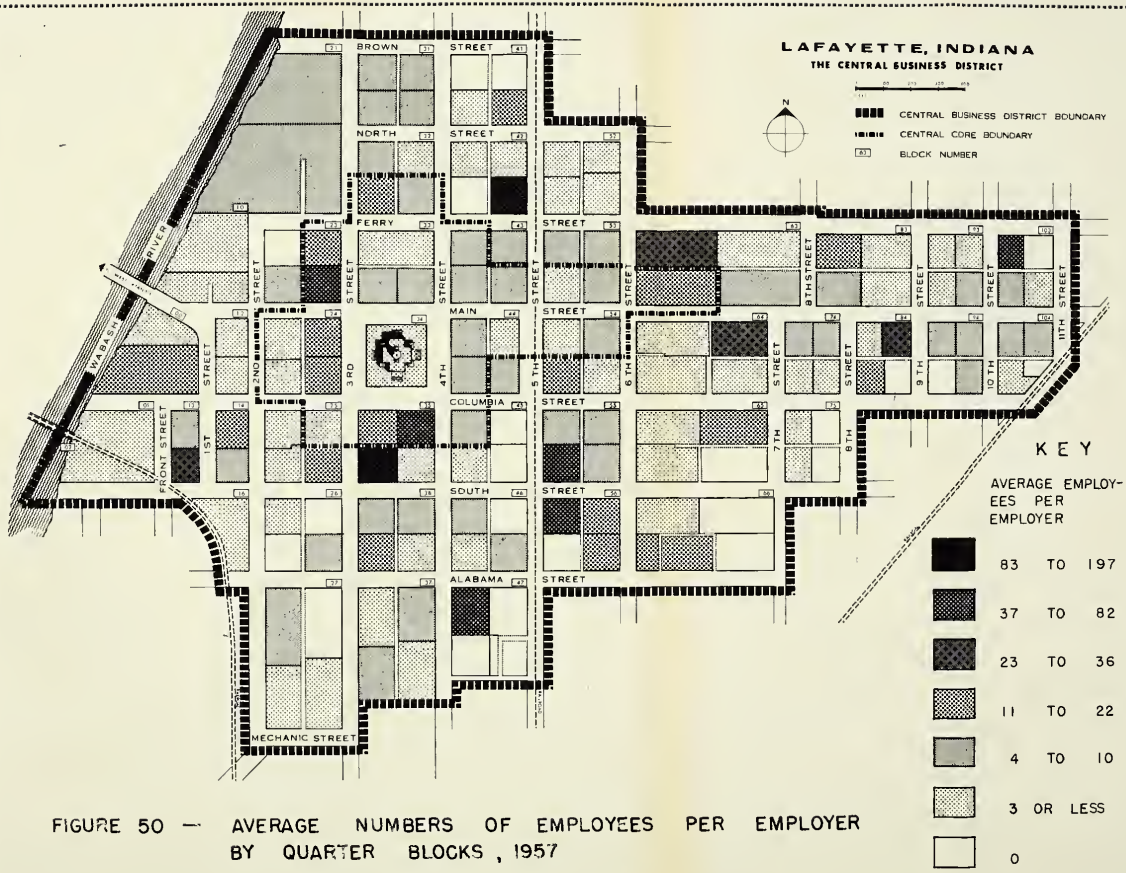


FIGURE 50 — AVERAGE NUMBERS OF EMPLOYEES PER EMPLOYER BY QUARTER BLOCKS, 1957

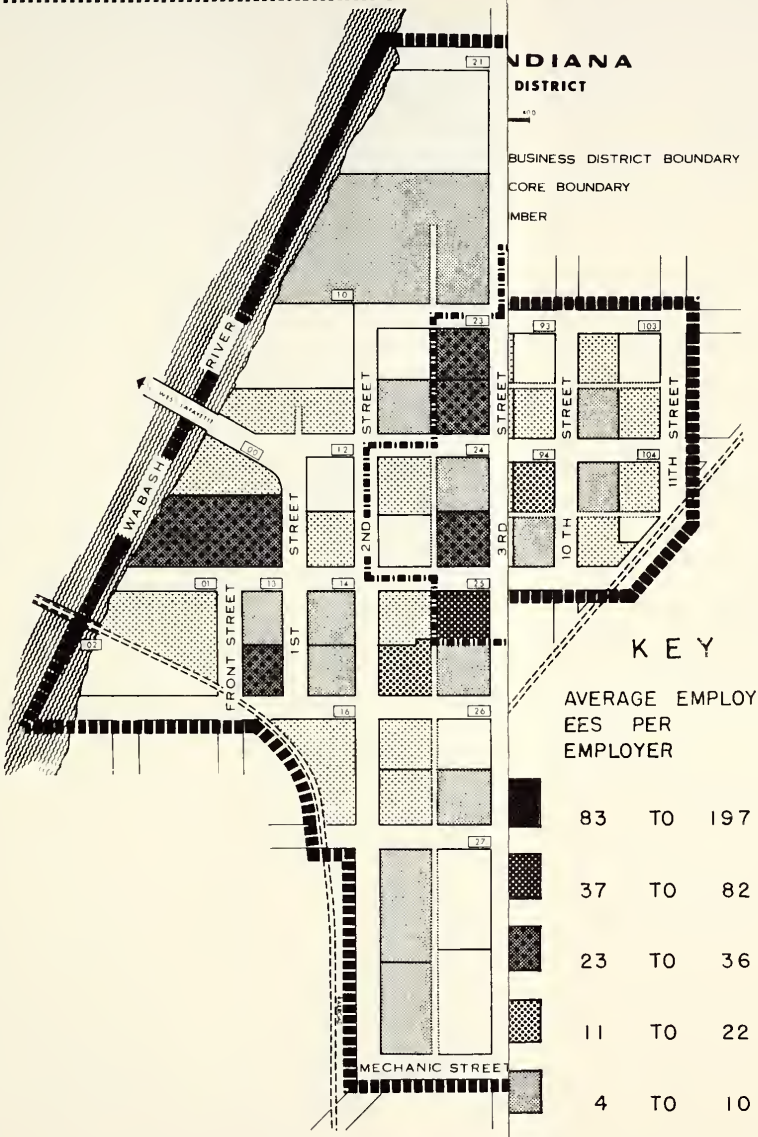


FIGURE 51 — AVERAGE
BY QUART

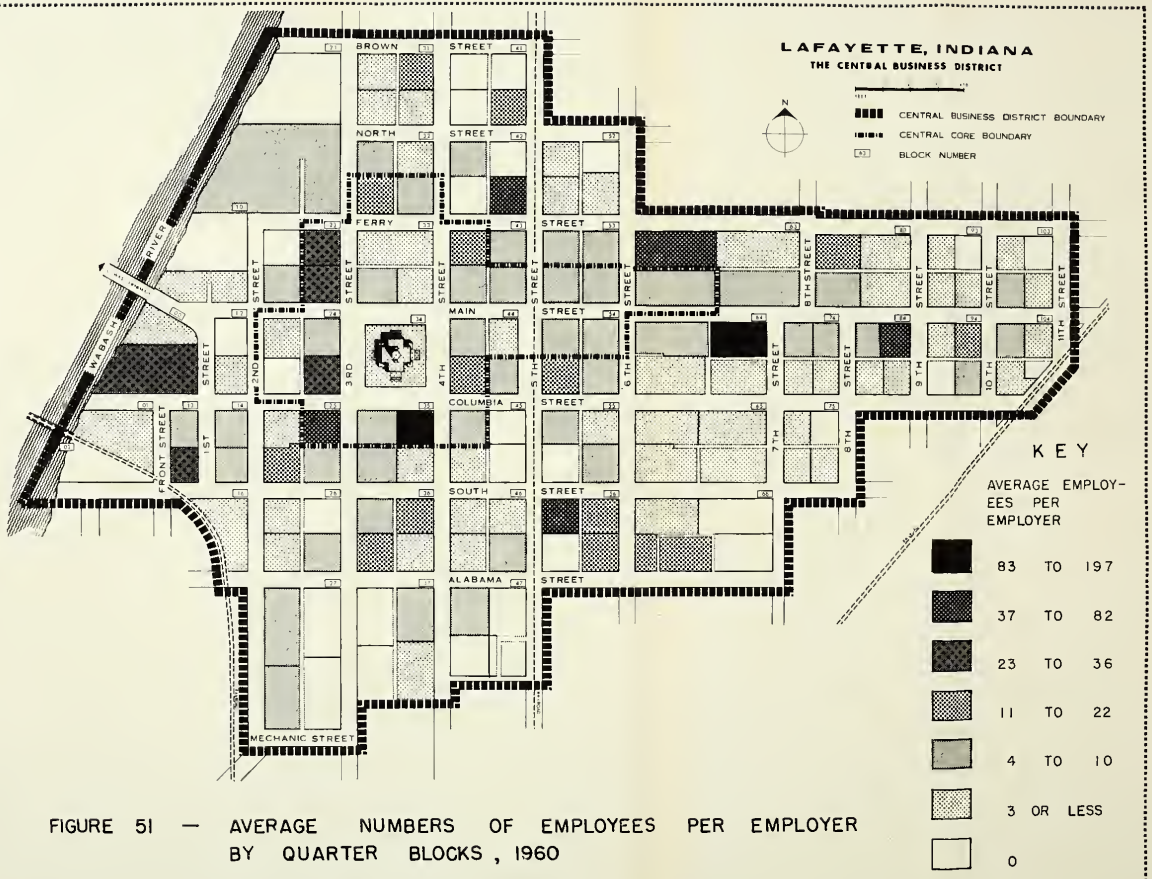


FIGURE 51 — AVERAGE NUMBERS OF EMPLOYEES PER EMPLOYER BY QUARTER BLOCKS, 1960

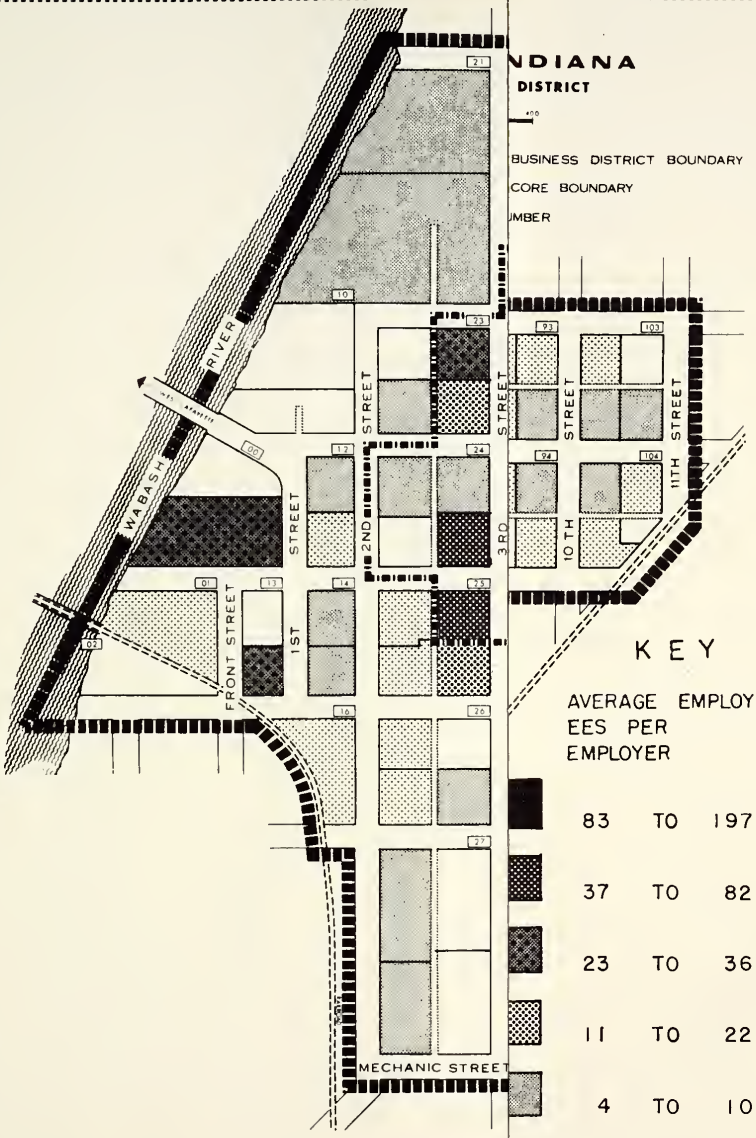


FIGURE 52 — AVERAGE
BY QUART

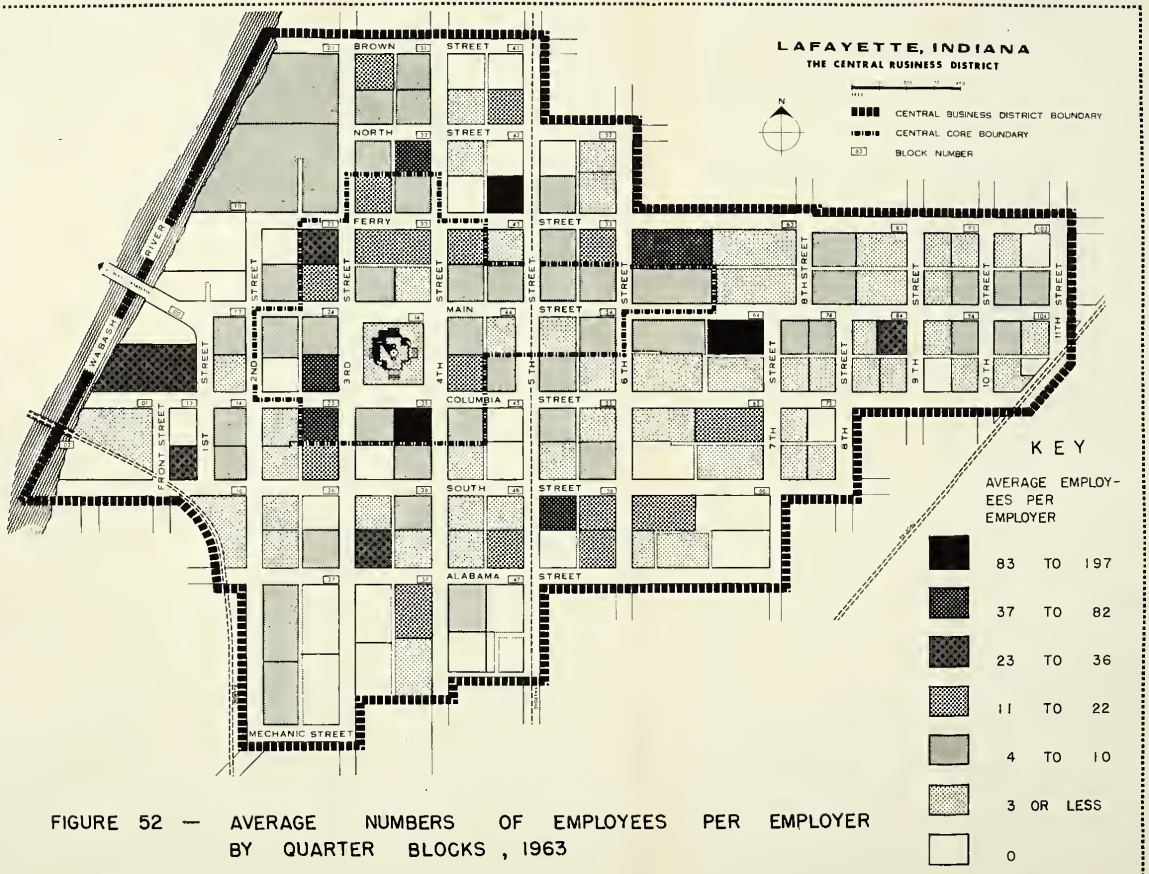


FIGURE 52 — AVERAGE NUMBERS OF EMPLOYEES PER EMPLOYER BY QUARTER BLOCKS, 1963

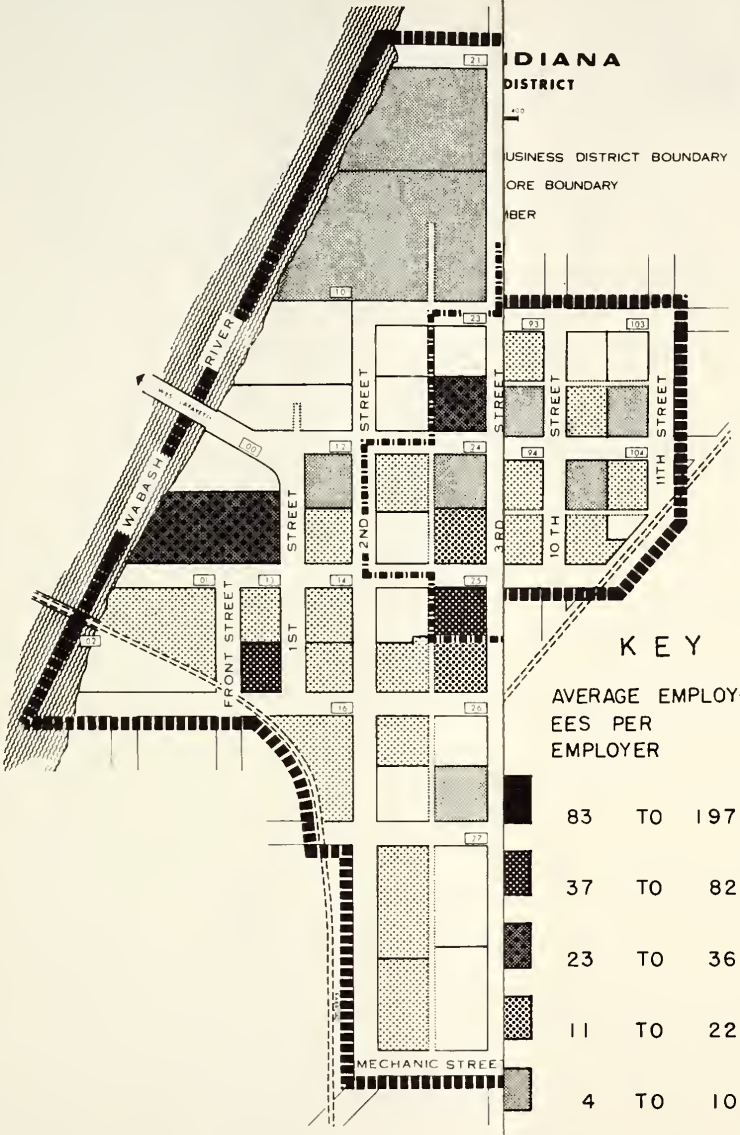


FIGURE 53 — AVERAGE N
BY QUARTE

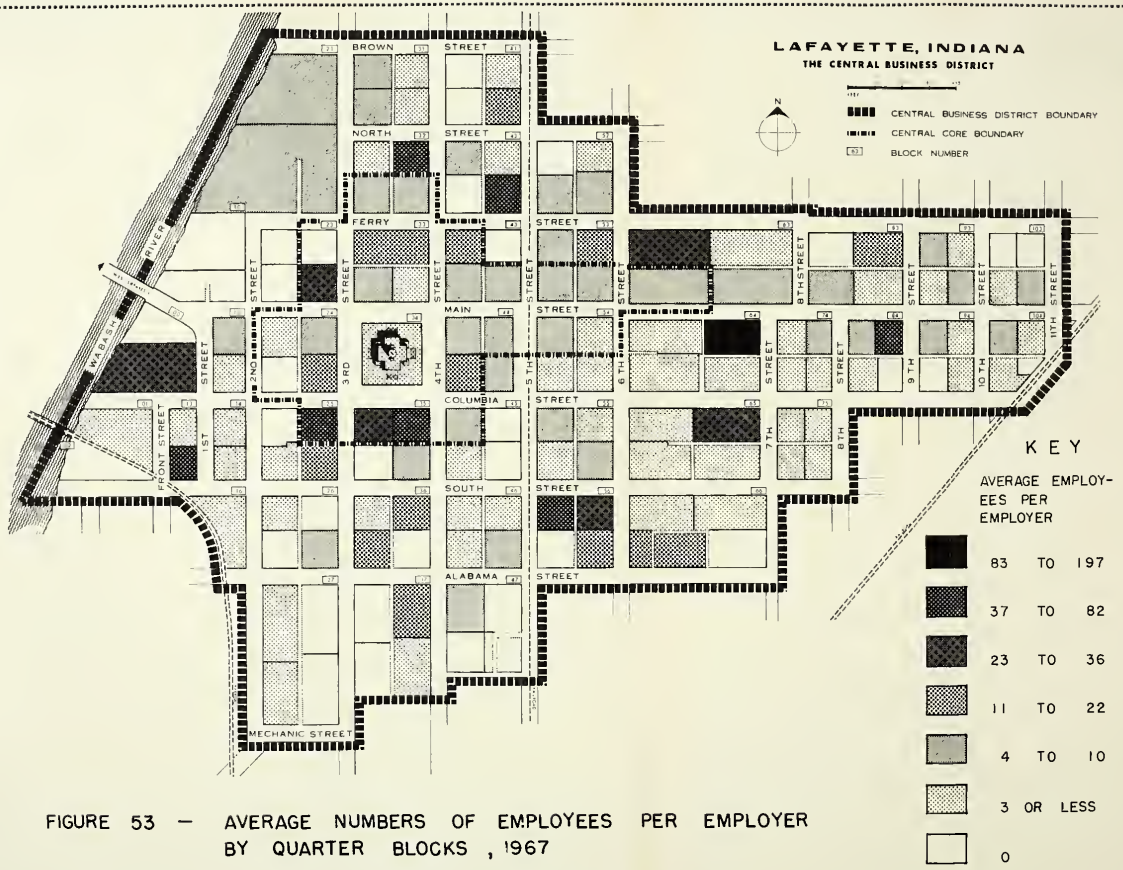


FIGURE 53 — AVERAGE NUMBERS OF EMPLOYEES PER EMPLOYER BY QUARTER BLOCKS, 1967

CHAPTER V. SUMMARY OF FINDINGS AND CONCLUSIONS

This study examined the changing functions of the CBD of Lafayette, Indiana during the period 1950 - 1967. In the following pages, the main findings of the study are summarized and conclusions are drawn.

1. In terms of numbers of business establishments, assessed valuations, and employment, the relative importance of the CBD in the urban area has declined. Thus:
   a. During the study period, the CBD lost about 22 percent of its business establishments. In 1950 it had about 828 establishments which decreased to about 642 in 1967 at an average rate of decrease of about 11 establishments per year. The greatest decrease occurred between 1957 and 1960 when the CBD lost about 70 business establishments in the three-year period. While in 1950 about 32 percent of the urban area business establishments were located in the CBD, in 1967 this proportion dropped to about 24 percent.
   b. The total CBD assessed valuations on land and improvements decreased about 26 percent during the study period. The core (which represents 18 percent of the CBD land area) carried an average of

49 percent of its assessed valuations on land and improvements and over 52 percent of its assessed valuations on land. While the core lost about 37 percent of its assessed valuations on land and improvements, the fringe lost only 14 percent and for the period 1950 - 1957 showed a slight gain. The assessed valuations on land dropped more heavily than those on improvements. The core lost 53 percent of its assessed valuations on land but only 19 percent of its assessed valuations on improvements. The fringe lost 23 percent on land and 9 percent on improvements. In 1950 the CBD carried about 14 percent of the urban area assessed valuations on land and improvements but in 1967 it carried only about 6 percent.

c. The total number of persons employed by CBD employers has increased by about 23 percent during the study period. In spite of this absolute increase, the relative importance of the CBD as an employment center has decreased from 1950 when the CBD had about 35 percent of the total urban area employment to 1967 when this value had dropped to about 23 percent.

2. The CBD occupied only a minute proportion of urban land. In 1950, it occupied 1.9 percent of the land in the urban area (the area defined by the corporate limits of Lafayette and West Lafayette). In 1967, it occupied only 1.6 percent.

3. The importance of the CBD can be appreciated by noting that, even after having undergone the declines outlined above, it still had about 24 percent of the business establishments in the urban area, carried about 6 percent of its assessed valuations on land and improvements, and accounted for about 23 of its employment in 1967, while occupying only 1.6 percent of the urban land. The central core which occupied only about 0.3 percent of the land in the urban area had about 12 percent of its business establishments, carried about 3 percent of its assessed valuations on land and improvements, and accounted for about 8 percent of its employment in 1967.
4. Throughout the study period, the major CBD space users were trade and service functions. These functions used an average of about 31 percent and 25 percent of the CBD floor space on all floors respectively. Residential uses and vacancies also occupied substantial space in the CBD (an average of 20 percent and 16 percent respectively).
5. CBD establishments, especially in the core, tended to diminish in numbers and get larger in size.
6. Of all the one-digit space users in the CBD, only services gained in total floor space. It gained about 11 percent between 1950 and 1967.
7. Among the two-digit retail functions, furniture, home-furnishings, and equipment retail were the only retail

functions which gained in floor space (about 3 percent). This gain occurred mostly in the core. Among the two-digit service functions, financial, insurance, and real estate services gained about 63 percent (in total floor space), business services gained about 77 percent, and professional services gained about 15 percent.

8. The retail and service categories (on the two-digit level) which are usually found in outlying shopping centers were most adversely affected in the CBD. As a group, these functions lost about 23 percent of their floor space in the CBD. However, the CBD still held, in 1967, more floor space devoted to these functions than all the principal shopping centers in the urban area combined.

9. Using the more detailed three-digit categories, a number of pertinent aspects of CBD functional changes are noted:

   a. Highly specialized functions, because of their community-wide attraction and/or the non-standardized goods and services they handle, tended to gain considerable floor space either in the core, in the fringe, or in both. In the entire CBD, credit services (other than banks) gained about 224 percent, welfare and charitable services gained about 285 percent, special educational services gained about 431 percent, and photographic

services (including commercial) gained about 49 percent. As expected, consumer oriented functions lost heavily. Thus groceries lost about 79 percent of their floor space and gasoline service stations lost about 58 percent.

b. Functions which require relatively compact floor space and those which thrive by comparative shopping tended to cluster together in the core. Thus, women's accessories, sporting goods, and jewelers gained floor space in the core and disappeared from the fringe.

c. The internal locational shifts in CBD functions tended to occur inwardly from the fringe to the core. No functions shifted from the core to the fringe.

d. Vacant floor areas (on all floors) decreased by about 15 percent in the core and increased by about 50 percent in the fringe. On the average, vacancies (705,000 square feet or about 16 percent of the total CBD floor space) occurred in 1960 probably as a result of the tremendous growth of shopping centers during the preceding years.

10. CBD parking facilities increased by over 130 percent during the study period. While in 1950 about 13 percent of the CBD land (excluding streets, alleys, and railroad right-of-ways) was devoted to parking, this proportion increased to over 30 percent in 1967.

The majority of this increase took place in the fringe. During the period 1950 - 1967, the CBD lost a total of about 530,000 square feet of street floor space but gained about 539,000 square feet of parking areas. The additional 9,000 square feet of parking was unused land in 1950. The fact that the CBD has gained even more parking areas than what was lost as street floor space illustrates an important facet of the CBD adjustments to the changing urban patterns brought about by the extensive use of the automobile.

11. In the fringe, the value of land increased appreciably compared to the average CBD land values. This increase was mainly due to the improved accessibility of the fringe resulting from more extensive use of the automobile, less reliance on fixed mass transportation lines, and increasing supply of parking facilities. No parallel increase occurred in the relative value of improvements.

12. A considerable portion of CBD land was not efficiently utilized during the study period. By examining the extent of land improvements in relation to land values it was found that in 1950, land underimprovements occurred mainly in the fringe. In 1967, more underimprovements were noted in both the core and the fringe. Beside the regular effect of depreciation of improvements over time, this trend is attributed to

the lack of maintenance, remodeling, and replacement of CBD structures.

13. Employers in the CBD were predominantly small. On the average, over two thirds of the CBD employers had less than four employees during the study period. An even higher proportion of these small employers were located in the core. Large employers, being mostly non-customer oriented or highly automobile oriented, tended to scatter over the less central locations in the fringe.

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APPENDIX I

APPENDIX I

SPACE-USE CLASSIFICATION AND CODING SYSTEM

0 - UNKNOWN SPACE USES

Two-digit level		Three-digit level	
Code	Category	Code	Category
00	Unknown space-use, no return of information.	000	Unknown space-use, no return of information.
1 - RESIDENTIAL			
11	Household units.	110	Household units.
13	Residential hotels.	130	Residential hotels.
2 - MANUFACTURING			
21	Food products - manufacturing.	210	Food products - manufacturing.
23	Apparel and other finished products made from fabrics, leather, and similar materials - manufacturing.	230	Apparel and other finished products made from fabrics, leather, and similar materials - manufacturing.
25	Furniture and fixtures - manufacturing.	250	Furniture and fixtures - manufacturing.

2 - MANUFACTURING (continued)

Two-digit level		Three-digit level	
Code	Category	Code	Category
26	Paper and allied products - manufacturing.	260	Paper and allied products - manufacturing.
27	Printing, publishing, and allied industries.	270	Printing, publishing, and allied industries.
28	Chemicals and allied products - manufacturing.	280	Chemicals and allied products - manufacturing.
3 - MANUFACTURING (continued)			
39	Miscellaneous manufacturing, NEC.*	390	Miscellaneous manufacturing, NEC.*
4 - TRANSPORTATION, COMMUNICATION, AND UTILITIES			
41	Railroad, rapid rail transit, and street railway transportation.	411	Railroad transportation.
42	Motor vehicle transportation.	421	Bus transportation.
		422	Motor freight transportation.
		429	Other motor vehicle transportation, NEC..

* Not otherwise coded.

Two-digit level		Three-digit level	
Code	Category	Code	Category
46	Automobile parking.	461	Private parking.
		462	Customer parking.
		463	Public parking.
47	Communication.	471	Telephone communication.
		472	Telegraph communication.
		473	Radio communication.
		474	Television communication.
		475	Radio and television communication (combined systems).
		479	Other communication, NEC.
48	Utilities.	481	Electric utility.
		482	Gas utility.
		483	Water utilities and irrigation.
		489	Other utilities, NEC.
49	Other transportation, communication, and utilities, NEC.	499	Other transportation, communication, and utilities, NEC.

Two-digit level		Three-digit level	
Code	Category	Code	Category
51	Wholesale trade.	510	Wholesale trade.
52	Retail trade - building materials, hardware, and farm equipment.	520	Retail trade - building materials, hardware, and farm equipment.
53	Retail trade - general merchandise.	531	Department stores - retail.
		532	Mail order houses - retail.
		533	Limited price variety stores - retail.
		539	Discount stores.
54	Retail trade - food.	541	Groceries (with or without meat) - retail.
		542	Meats and fish - retail.
		544	Candy, nut, and confectionery - retail.
		546	Bakeries - retail.
		549	Other retail trade - food, NEC.

Two-digit level		Three-digit level	
Code	Category	Code	Category
55	Retail trade - automotive, marine craft, aircraft, and accessories.	551	Motor vehicles - retail.
		552	Tires, batteries, and accessories - retail.
		553	Gasoline service stations.
56	Retail trade - apparel and accessories.	560	Clothing - general retail.
		561	Men's and boy's clothing and furnishings - retail.
		562	Women's ready-to-wear - retail.
		563	Women's accessories and specialties - retail.
		564	Children's and infant's wear - retail.
		566	Shoes - retail.
		567	Custom tailoring.
		568	Furriers and fur apparel - retail.
		569	Other retail trade - apparel and accessories, NEC.

Two-digit level		Three-digit level	
Code	Category	Code	Category
57	Retail trade - furniture, homefurnishings, and equipment.	571	Furniture, homefurnishings, and equipment - retail.
		572	Household appliances - retail.
		573	Radios, televisions, and music supplies - retail.
58	Retail trade - eating and drinking.	581	Eating places
		582	Drinking places (alcoholic beverages).
59	Other retail trade, NEC.	591	Drug and proprietary - retail.
		592	Liquor - retail.
		593	Antiques and secondhand merchandise - retail.
		594	Book and stationery - retail.
		595	Sporting goods and bicycles - retail.
		596	Farm and garden supplies - retail.
		597	Jewelry - retail.

5 - TRADE (continued)

Two-digit level		Three-digit level	
Code	Category	Code	Category
59	Other retail trade, NEC. (continued)	598	Fuel and ice - retail.
		599	Other retail trade, NEC.
6 - SERVICES			
61	Finance, insurance and real estate services.	611	Banking and bank-related functions.
		612	Credit services (other than banks).
		613	Security and commodity brokers, dealers, exchanges, and services.
		614	Insurance carriers, agents, brokers, and services.
		615	Real estate and related services.
		616	Holding and investment services.
62	Personal services.	621	Laundering, dry cleaning, and dyeing services.

Two-digit level		Three-digit level	
Code	Category	Code	Category
62	Personal services (continued).	622	Photographic service (including commercial).
		623	Beauty and barber services.
		624	Funeral and crematory services; cemeteries.
		625	Apparel repair, alteration and cleaning pickup services; shoe repair services.
63	Business services.	631	Advertising services.
		633	Duplicating, mailing, and stenographic services.
		634	Dwelling and other building services.
		635	News syndicate services.
		636	Employment services.
		637	Warehousing and storage services.
		639	Other business services, NEC.

Two-digit level		Three-digit level	
Code	Category	Code	Category
64	Repair services.	641	Automobile repair and services.
		649	Other repair services, NEC.
65	Professional services.	651	Medical and other health services.
		652	Legal services.
		659	Other professional services, NEC.
66	Contract construction services.	661	General contract construction services.
		662	Special construction trade services.
67	Governmental services.	671	Executive, legislative, and judicial functions.
		672	Protective functions and their related activities.
		673	Postal services.
		675	Military bases and reservations.
68	Educational services.	680	Educational services.

6 - SERVICES (continued)

Two-digit level		Three-digit level	
Code	Category	Code	Category
69	Miscellaneous services.	691	Religious activities.
		692	Welfare and charitable services.
		699	Other miscellaneous services, NEC.
7 - CULTURAL, ENTERTAINMENT, AND RECREATIONAL			
71	Cultural activities and nature exhibitions.	710	Cultural activities.
72	Public assembly.	721	Entertainment assembly.
73	Amusements.	730	Amusements.
74	Recreational activities.	741	Sports activities.
76	Parks.	761	Parks - general recreation.
		769	Other parks, NEC.

Two-digit level		Three-digit level	
Code	Category	Code	Category
91	Undeveloped and unused land area (excluding non-commercial forest development).	910	Undeveloped and unused land area (excluding non-commercial forest development).
94	Vacant floor area.	940	Vacant floor area.
95	Under construction.	950	Under construction.